

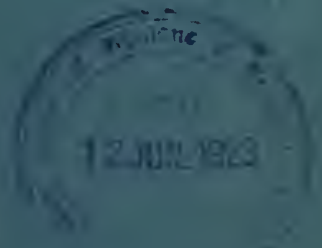
HONGKONG.

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THE EPIDEMIC
OF
BUBONIC PLAGUE
IN
1894.

MEDICAL REPORT.

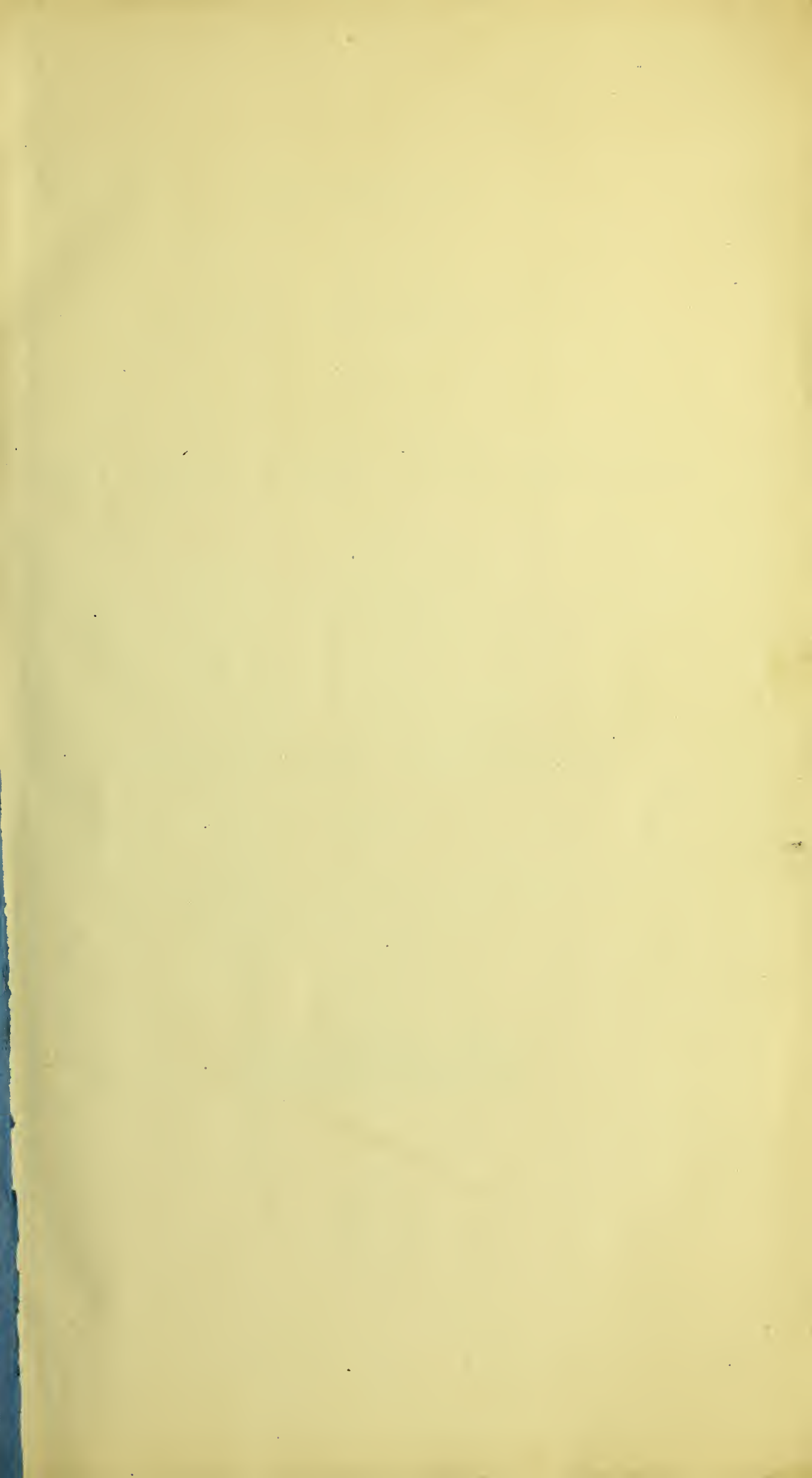
By James A. Lawson, M.B., Medical Officer in charge of Epidemic Hospital.



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HONGKONG.

MEDICAL REPORT ON THE EPIDEMIC OF BUBONIC PLAGUE IN 1894.

*Laid before the Legislative Council by Command of
His Excellency the Governor.*

GOVERNMENT CIVIL HOSPITAL,

HONGKONG, 2nd March, 1895.

SIR,

I have the honour to forward to you Dr. Lowson's report upon the late Plague epidemic in this Colony.

It reflects the greatest credit on its author for the care with which the records have been kept from the beginning, the practical way in which the symptoms, progress and treatment of the disease and its *post mortem* appearances have been treated, and the recommendations that have been made to prevent its occurrence in the future.

The necessity for remedying the results of faulty construction of the houses in the Chinese quarters, the want of ventilation, light and air in them, the impossibility of keeping them clean and wholesome, the inadequate water supply, the want of proper drainage, the overcrowded condition of the houses, the filthy condition of wells, the necessity for proper latrine accommodation, and the enormous amount of filth collected in the houses have now been fully revealed. I first called the attention of Government to the state of things I have mentioned in my report dated the 15th April, 1874, within six months of my arrival in this Colony. In this report I mentioned by name the streets and lanes, and the position of many gullies without a name in that portion of Taipingshan which has now been walled in, and the condition of filth in which I found the houses, also streets and alleys in other portions of the town; almost the same state of things was found in 1894. Yet a further special report was sent in by a Commission appointed to verify the statements made in my report which was sent in in May 1875. In 1880 Mr. CHADWICK arrived with a Royal Commission to investigate the condition of things described, and his full report to the Secretary of State appeared in a Blue Book. Six years afterwards he again visited the Colony and expressed his surprise at finding how little had been done to remedy the state of things he had described, and again reported on them. Many laws have been made in the twenty years previous to 1894 to remedy the insanitary state of the Colony, but most have remained dead letters owing to the difficulties of enforcing them and the prejudices of the Chinese especially and other sections of the community.

Since 1874 the divisions of the City of Victoria inhabited by Chinese have increased more than three fold in size, and the new portions are in nearly as bad a condition as the old.

The labours of Hercules in cleansing the Augean stables were a trifle compared with that which the Government has to contend with in the near future in cleansing the City of Victoria and other inhabited portions of the Colony.

Another report from the Permanent Committee of the Sanitary Board will describe the work done by those working under their supervision.

Dr. Lowson's report is a most interesting and valuable addition to medical literature, and will no doubt receive the commendations it deserves. He was most unsparing of himself during the progress of the epidemic and untiring in his efforts to render assistance to all who were working under his superintendence. The work done by him during this trying period cannot be too well recognised.

That the latrines are a source of propagating the infection as described by Dr. Lowson there is no doubt, and proof is afforded by the dates of the closing of the surrounding houses. I found on inquiry that during the end of May and the beginning of June, when the prevailing winds were from the east and north, the houses to the west and south of the latrines were closed and afterwards, when the prevailing winds were from the south and west, the houses to the north and east of the latrines were closed, being found infected and more than three deaths having occurred in each of them. Mr. RAM made elaborate plans of the City of Victoria showing where the plague existed, and the proportion of houses in each district that were infected.

I have the honour to be,

Sir,

Your most obedient Servant,

PH. B. C. AYRES,
Colonial Surgeon.

The Honourable J. H. STEWART LOCKHART,
Acting Colonial Secretary.

GOVERNMENT CIVIL HOSPITAL,

HONGKONG, 1st March, 1895.

SIR,

I have the honour to forward herewith for your information a Report upon the Epidemic of Plague in Hongkong in 1894, so far as it concerns the medical work which I carried out under your directions.

I regret extremely that several important matters—including the epidemiology of the disease—which I could have wished to discuss at some length, have been touched upon very superficially, or passed over altogether in this Report. I will ask you to accept as an excuse for my shortcomings in these respects the following facts of which you are, I believe, already cognizant :—

- (a) The overworked condition of the Medical Department during the Epidemic, and at the present time has necessitated my writing most of these pages during odd half hours which would, under other circumstances, have been devoted to recreation or repose.
- (b) The proofs have had to be corrected during a period of convalescence succeeding a prolonged attack of malarial fever.
- (c) The temperature charts and pulse tracings have been reproduced with some difficulty with the scanty appliances at the command of the local printers.

I have written strongly—as I feel strongly—concerning the existence and condition of the Tung Wa Hospital, but you will understand that my objections to that institution are based entirely upon professional grounds. Conducted as it is at present, under the patronage and protection of the local Government, a certain amount of countenance is, or at any rate appears to be, lent to what I can only describe as medical and surgical atrocities. In addition to this, I believe that it constitutes a serious menace to the health of the community. I should, however, be sorry to have it supposed that I do not recognise the fact that where a large native population is concerned, some deference has to be paid to the inclinations, and even to the prejudices, of the majority. Personally I believe, however, that a scheme might be devised which would satisfy the wishes of the Chinese without sacrificing the sanitary well-being of the Colony; and I think that it is a matter for congratulation that the publicity that has been recently given to the system under which the institution in question has been conducted in the past has already resulted in a marked improvement in the direction of order and cleanliness. In reading over the pages which I send you herewith I am fully conscious that I have expressed myself somewhat uncompromisingly upon this and upon some other topics; but I have thought (and I hope that in this I shall have your concurrence) that in writing a medical report I am perhaps justified in taking a purely scientific view of the questions under discussion, leaving it to others to advance what is to be said (and I do not doubt that something is to be said) upon the side of expediency and public policy.

I have the honour to be,

Sir,

Your most obedient Servant,

JAMES A. LOWSON,

*Medical Officer in charge of Epidemic Hospital and
Acting Superintendent of Government Civil Hospital and
Lunatic Asylums.*

DR. PH. B. C. AYRES, C.M.G.,
Colonial Surgeon.

THE EPIDEMIC OF BUBONIC PLAGUE IN HONGKONG, 1894.

To write an historical introduction upon the subject of Plague should at the present moment be an easy matter, considering the many classical monographs and articles which have been written upon it within the last century. When the present outbreak occurred in Hongkong, the only authority that I had at my disposal was the article on Plague in Quain's "Dictionary of Medicine" by J. N. RADCLIFFE, the experiences that we have had here being to a considerable extent new to the present generation. Latterly, the articles in the *Encyclopædia Britannica* and *DAVIDSON'S Tropical Medicine*—not to mention *HECKER'S* classical work—were brought to my notice. I have not been able to make myself familiar with the opinions of *CABIADIS* and others in print, consequently the notes on the disease which I now present are almost solely founded on experiences here during the past year.

The history of Plague, as regards the civilised West, has been told times without number, but, with the exception of *ROCHER'S* papers, the history of the disease in the Far East is a perfect blank. One would expect, seeing that China has the unenviable reputation of being the seat of the plague, that the Chinese classics would show some trace of the existence of epidemics of the disease. I have requested Mr. J. DYER BALL, one of the most eminent, and certainly one of the most painstaking of Chinese scholars, to make careful enquiry into the subject, and the result is that, after months of diligent searching, he finds that Chinese history makes no reference to any epidemic which has left a mark on the ineffaceable records of time. The epidemic in Canton of 1894 is by far the most noticeable case (of which there is any record) of the disease carrying off large numbers of the population. The first time in contemporary history that plague has really made itself felt in China, was in 1844—just after the Egyptian epidemic had left its mark on European medicine,—and in this case, by the records at hand, the epidemic did not work nearly so much havoc amongst the population as it did during the year recently finished. Plague has been practically endemic in Pakhoi for over twenty years, as has been recorded by Drs. LOWRY and HORDER; the only occasion when it has been at all epidemic being about ten years ago.

The epidemic in Canton, according to the information at our disposal, began early in February 1894. During the four months following it was practically unknown in Pakhoi. In May it broke out in Hongkong, ninety miles from Canton, and three hundred and seventy miles from Pakhoi. Negative evidence is wanting to show that it did not come from Canton. Positive evidence is wanting to show that it came from Pakhoi.

An average of 11,090 passengers came from Canton every week whilst only 64 came from Pakhoi.

There were many patients fleeing from Canton on account of the plague,—none fleeing from Pakhoi.

Most certainly tens of thousands of persons died from plague in Canton, from January 1st to May 1st, 1894, whilst the dead were to be reckoned by tens only in Pakhoi during the same period, there being three or four steamers every day from Canton to Hongkong whilst there were only six in a month from Pakhoi.

Since 1873, it has been endemic in the province of Yunnan, a district about 900 miles from Canton, where the numbers dying of it yearly have been considerable. All this circumstantial evidence goes to prove that the disease was imported to Hongkong from Canton (and not from Pakhoi) although in Canton it has been unknown, until the present outbreak, since 1850.

On March 2nd, 1894, a large Chinese procession was held in Hongkong, and as a result large numbers of people came from the surrounding country, it being estimated that 40,000 of the lowest class coolies came from Canton for the occasion. It has been maintained by some persons that this was the period during which Hongkong became infected. It is possible, but it appears to me that before nine weeks had elapsed the epidemic would have reached such alarming proportions that it must have been noticed earlier. It was only in April that people were reported

as fleeing from Canton on account of the plague, and as these people were almost certain to have been in contact with the sick, it is most probable that some of them brought the disease into the Colony.

"*The Overland Friend of China* of 23rd May, 1850, contains the following:—

" 'The city of Canton, and the neighbouring towns and villages
 " 'are afflicted by a malignant fever. It is commonly
 " 'called Typhus; some Europeans—physicians—are of
 " 'opinion that it is akin to the yellow fever of the West
 " 'Indies; others think that it resembles the plague which
 " 'desolated London two centuries ago. The disease is
 " 'said to be fatal invariably, its victims linger three or
 " 'four days, though in some instances they have died in
 " 'twelve hours. More than one European doctor cheer-
 " 'fully offer their services,—but the Chinese are obstinate
 " 'in their adherence to old custom—old ignorant quackery.
 " 'The distemper has not made its appearance at the
 " 'Factories, and as it may arise from a want of cleanliness
 " 'among the people, we are in hopes that it will not
 " 'extend to Europeans.' "

The following remarks by A. P. HAPPER, Jr., in the Imperial Maritime Customs' Annual Report, 1889, (dated 22nd February, 1890) are those of a most careful observer, although some of his statements as to the limitation of the disease are erroneous—probably owing to a lack of knowledge of the literature upon the subject:—

" 'In spite of such a favourable climate Mêng-tzü (in Yunnan), in common
 " 'with other parts of Yunnan, has suffered annually for a period of
 " 'years from the plague, (病子痒), a kind of malignant fever,
 " 'fatal in a few days, having as one of its symptoms a hard swelling
 " 'on the neck, in the armpits, or in the groin, which has carried off
 " 'a number of its inhabitants. Indeed, the presence of fallow land
 " 'in the near neighbourhood of the city is attributed to the decima-
 " 'tion of the farming population by the pest. On approach of the
 " 'epidemic, the first victims are rats, which fearless of human beings,
 " 'rush madly into their presence, and after capering around the room
 " 'fall dead at their feet. The next to suffer are cattle: the fatal
 " 'effect among them is equally as great. Surrounded by such
 " 'distressing signs, it is no wonder that inhabitants of hamlets often
 " 'desert their houses and belongings *en masse*, to seek immunity on
 " 'the mountain side; for a curious fact about the disease is, that it
 " 'never descends to places under 1,200 ft. of altitude above the sea,
 " 'and it rarely scales heights over 7,200 ft. high. Strangely enough
 " 'also, it seldom attacks people sojourning in Yunnan from other
 " 'provinces, its victims being confined to the aborigines and to
 " 'native-born Chinese. This disease certainly offers an interesting
 " 'field for the study of western medical science, and the physician
 " 'who will find a specific against its ravages will be hailed as the
 " 'deliverer of Yunnan, so helpless are the native practitioners in
 " 'treating it.' "

The question of the infection of rats, previous to the epidemic being noticed in human beings, has been made too much of, as have several other points in connection with plague. It is only natural that as rats have their snouts about an inch above the floors of houses they are much more liable to inspire plague-infected dust than people who have their mouths at least two feet higher. Inoculation too is easy. It must be remembered that rats usually die two or three days after inoculation; therefore the statement that the deaths of rats generally precede an epidemic—although generally true—is only dependant on the fact that rats and other small animals are peculiarly liable to be infected, and have a very short incubation period of the disease. Their habits and residence also conduce to their early affection after the disease has been introduced.

Many points have yet to be cleared up scientifically, as for instance the infection of pigs and cattle. It has been stated that these animals suffer from the same disease, but it would be better, by our later experience, to prove that it is definitely plague. I regret that after the hurry of the late epidemic our stock of plague bacilli has disappeared, but it is to be hoped that an opportunity for eluci-

dating some doubtful points will occur later on. Going upon recent experience here we have as yet no definite proof that, during this epidemic, pigs, cattle and dogs were infected. KITASATO's observations were unfortunately limited to what may be termed "Toy" animals, and it would have been more satisfactory if animals which are generally used for human consumption had been utilised also for experiment, and the direct connection of the disease between human beings and these animals had been definitely proved, so much depending on the food supply of certain communities in the Far East at the present moment.

It is satisfactory to know that the *causa causans* of the plague has been discovered, and some of us must regret that our time, being entirely taken up by practical work in connection with the treatment of the plague—for which no fame is secured—we had so little time to look to the more purely scientific side of the question.

In the following pages stress has been laid on the paucity of medical men who could be found to help in our extremity. It may be thought that we surely had enough time to make some efforts in the direction of discovering bacilli. I can only say that after a day of from twelve to eighteen hours hard and exciting work in the trying heat of a Hongkong summer none of the men who had to bear the brunt of medical supervision, and who had to look forward to a prolonged mental strain, were much inclined to start work with the microscope by gaslight,—more especially as they were generally completely tired out and ready to sleep immediately; or were too exhausted to secure the repose necessary to enable them to start afresh next day. It may not be out of place to mention that in the Egyptian epidemic in 1843 half of the French physicians in Cairo perished from the plague; and in the Russian epidemic in 1879 (where Vetlianka was the principal seat of disease with about five hundred cases), the first three medical men who were in attendance on the sick died, as did numerous attendants. These were somewhat appalling figures when the epidemic broke out, and the outlook was not much improved when our numbers went up to four by the addition of Surgeon-Major JAMES, A.M.S., and Surgeon PENNY, R.N., the European nursing staff being reinforced by two Police Constables. It is noticeable that none of those who were in active attendance on, or engaged in removing, the sick *during the whole period* were attacked. This I put down to the instructions that were given at the beginning of the epidemic. On the second or third day after the epidemic was discovered it was proved that the disease could be propagated through the blood by inoculation. The fæces were also suspected as an additional mode of conveyance of infection. Cultures were made from these, but unfortunately this method of infection was not proved until KITASATO arrived, time being wanting to make frequent observations of our culture tubes. In the meanwhile, notwithstanding want of proof, the fæces were always looked upon as the most prolific source of infection carbolic acid or quicklime being added to them before disposal in the sea, and it was a satisfaction to us when KITASATO confirmed our suspicions. The question as to whether infection from the contents of buboes could occur was answered in the affirmative early, and every precaution as regards antiseptics was taken in opening these swellings. With our present knowledge of the nature of the epidemic it may be said (and has been said) that our precautions at the beginning were excessive, but here again it is the same old story of "wisdom after the event." By the knowledge gained in Hongkong during 1894, plague has been divested of a great deal of its terrors if care be taken by the people engaged in fighting it. Not only this, but if proper sanitary precautions are taken, no civilised country should ever be the seat of an epidemic of plague. I am bound to admit that, if ever any place was ripe for such an epidemic, certain parts of Hongkong in May 1894 were in a condition for it to spread like wildfire. Full details as to the condition of the City of Victoria are given later, and it is satisfactory to know at the present time that *attempts* are being made by those in authority to remedy faults which have been accumulating for years, and which have been pointed out before but without result.

In these times of scientific research it is not too much to expect that some "serum" treatment will be found to neutralize the toxins produced by the Pest Bacilli, and when the further researches of KITASATO and YERSIN are published I hope we shall have some remedy suggested which will enable us to reduce the very high mortality due to Plague, should it ever unfortunately come to these shores again.

In the following pages I have avoided theorizing as far as possible, what follows being more a report on the epidemic than a treatise on the disease.

DEFINITION.

Bubonic Plague is a specific infectious fever, characterised by the presence of a definite bacillus, primarily affecting especially the lymphatic system, and afterwards the cerebral and vascular systems. When considering the symptoms (if this definition is kept in mind) it will be found to embrace all the developments which take place in the disease.

CAUSE.

The existing cause of the disease is a bacillus, which was, so far as the Hongkong epidemic is concerned, discovered first by Dr. S. KITASATO, of Tokyo, on June 14th, in the Kennedytown Barrack Hospital. The bacilli are found in the faeces, in the contents of buboes, and in the blood.

Predisposing causes are, speaking generally, insanitary conditions, and of these *Filth and Overcrowding* ⁽¹⁾ must be reckoned as two of the most important factors. The district of Taipingshan supplied these factors in a marked degree at the beginning of the outbreak, the majority of the houses being in a most filthy condition, as owing to the uncleanly habits of the people the amount of what is generally termed rubbish accumulates in a Chinese house in a crowded city to an extent beyond the imagination of most civilised people. When to a mixture of dust, old rags, ashes, broken crockery, moist surface soil, etc. is added faecal matter, and the decomposing urine of animals and human beings, a terribly insanitary condition of affairs prevails; and that this is no overdrawn picture of what was to be met with in Taipingshan, many Europeans now know to their cost. The habits of the people are filthy, and their surroundings are correspondingly filthy if household scavenging is not looked after properly.

Overcrowding ⁽²⁾ was present also. The question as to how many people may go to the acre without overcrowding, must receive a different answer in every separate town according to the character and height of the houses, and the breadth of the streets. When, however, 30 to 40 people are huddled together with a cubic air space of less than 150 cubic feet per head, and that in a house which has no through ventilation, then one would suppose that it must be admitted that there is overcrowding; nevertheless one finds in Hongkong would-be sanitarians who will not admit the existence of overcrowding on any basis but that of how many go to the acre.

Other *insanitary* conditions were not wanting. In May 1894 in Taipingshan, and in other districts of Hongkong a large proportion of the houses were damp and badly ventilated, with drains of a most primitive and insanitary description. Earthen floors or floors laid with chunks of stones were the general rule while in most houses light seemed to be looked upon as an enemy to be carefully shut out.

Basements ⁽³⁾ and cellars have been allowed to be inhabited practically all over Hongkong. These have the most meagre provision of ventilation and light, more especially those to the west of the Civil Hospital, where the hill rises abruptly; and in Taipingshan in the neighbourhood of Tank Lane. Dwellings in these districts are very damp indeed in the summer season, a large number of houses being built directly back to back, ⁽⁴⁾ or with only a very narrow lane between them.

In the infected areas the *drainage* ⁽⁵⁾ arrangements within private premises are bad, a few houses only having been connected to the new system, whilst the majority have the old fashioned drains, square in section, badly constructed, leaking in all directions, and favouring deposit of solid matter—especially during the dry season—and directly connected with the old drains which have been relegated to the duty of conveying storm waters since the introduction of the new system. A few have no drainage at all.

The food supply of Hongkong is fairly good but could be improved from a public health point of view if the wishes of the Colonial Veterinary Surgeon were more carefully attended to. The Chinese here have entertained the idea that the

(1) In 1887 an Ordinance entitled *The Public Health Ordinance* was passed which handed over the sanitary control of the Colony to a semi-representative body called the Sanitary Board. Much of the work so delegated to it has been carried out in an efficient manner. The external scavenging of the streets leaves little to be desired, and many efforts have been made to encourage and foster a higher standard of cleanliness amongst the native population. Unfortunately the Chinaman resents strongly any attempts to interfere with his domestic privacy, and a little too much deference has probably been shewn to his prejudices in this respect. In any case it must be admitted that the interior of the native houses was such as may fairly be described as a disgrace to a civilized community.

(2) The Health Ordinance provides for overcrowding, but its provisions were not put into effect owing to opposition by the natives. (See section 67 of Ordinance.)

(3) At the time of the outbreak of the Epidemic there was no restriction as to the use of basements as places for habitation.

(4) There is no provision for back-to-back and badly ventilated houses.

(5) The Ordinance gives large powers in Drainage matters, Sections 49-54 dealing with the subject of drains.

epidemic was caused by eating pigs from Pakhoi, but as none of the pigs imported showed any sign of disease, and as pigs have not yet been proved to be susceptible to the disease, this supposition has to be rejected.

The water supply is very good, but at present it is scarcely sufficient to meet the heavy demands made on it, on account of the waste and misuse of water within the closely built and thickly inhabited areas of the City, the water supply to the Chinese being almost unlimited. Its waste and misuse are, however, being remedied rapidly.

In addition to the Government supply there are numerous wells situated generally in houses, latrines, back-kitchens and other out-of-the-way places. These wells all come within the category of "Shallow Wells" and must as long as they exist prove a serious danger to the Public Health. These wells are numerous in the affected areas and some of them simply reek with organic matter; others have a considerable amount of ammonia and nitrites; whilst a very few only are at all fit for drinking purposes. To what extent the spread of the epidemic was due to these wells has not yet been determined; it is easy to see the possibility of their pollution by plague patients, but the question has not yet been studied carefully. Many are now shut up.

LATRINES.

To my mind one of the most important factors in the spread of the disease was the bad condition of the *latrines*. In Hongkong latrines are in some cases public, and in some cases private property; in both cases they are under the control of the Sanitary Board, and are used by the bulk of the Chinese population, few Chinese dwellings being provided with accommodation of this kind. The following extract from a letter I sent to the Colonial Surgeon bearing date 15th August, 1894, explains itself:—

"In my opinion the condition of the latrines in the Colony has been partly responsible for the spread of the plague epidemic. My reasons for thinking so are as follows:—

"(1) The plague bacillus is abundantly found in the fæces.

"(2) There is practically no disinfection of fæces in the latrines. The "gutters are washed down occasionally with a mixture of "Jeyes' Fluid and water, but only some material described as "opium packing is added to the fæces to raise its value as a "manure. This latter is practically of no use as a disinfectant.

"(3) Several times during the epidemic these latrines were not cleaned "out as regularly as they ought to have been. (This is not to "be wondered at considering the scarcity of labour.)

"(4) Plague-stricken coolies must often have visited the latrines, and "each soil pan must necessarily have become a great danger to "every healthy person who went into the latrine. A glance "at one of these latrines will at once bring this prominently "before you. Their peculiar construction makes it absolutely "certain that any individual using them must inhale air laden "with impurities, and each soil pan must have been a prolific "breeding ground for the poison. There is here a favourable "opportunity for being attacked, as all the three most usual "methods of infection—inoculation, respiration and entrance by "alimentary canal—may occur.

"(5) Not only this but from the statistics and facts at present at my "disposal, I consider that these latrines were a source of infec- "tion to houses round about them; so that it was not neces- "sary for the people to go into the latrines to get the disease, "it was probably borne by the air to neighbouring houses.

"There is a licensed private latrine at 113, Second Street. At a casual "glance the shut up houses all around bear eloquent testimony upon this point. "Round this latrine there is scarcely a house occupied.

"In Centre Street at the corner of Third Street there is a latrine. On pass- "ing into Third Street to the South numerous houses are shut up and several "cases have occurred in neighbouring houses.

"At 82, First Street, there is a latrine with an entrance at 91, Second Street. "A very large number of cases occurred round about this place.

"Around several other latrines, more especially at 29, First Street, numerous cases occurred; but in some of these instances it is difficult to prove that the severity of the epidemic was so locally affected on account of the large number of cases which occurred in almost every house.

"Sheung Fung Lane, off Second Street and opposite to No. 91 of that street, is practically shut up. The mortality here was very great. The inhabitants were principally night-soil coolies and *almost all died*. The occupants of houses in Third Street adjoining this were also numerous attacked.

"I might mention that there is a latrine, no doubt well known to the sanitary authorities, in Centre Street Market, and three yards distant from it a large quantity of meat is often hanging for hours at a time.

"The two questions:—(i) Was there infection of coolies in the latrines? and (ii) Was there infection of the neighbourhood round about? must go hand in hand seeing that so many of the inhabitants use the latrine. It must be remembered, however, that women and children do not patronise these institutions so much as male adults, and as large numbers of the former have died, I think it must be conceded, notwithstanding the fact that personal contact (as explained later on in this Report) may cause infection, that both these questions should be answered in the affirmative. If not, why should not all parts of these streets be equally affected?

"I would ask you to inspect these latrines personally to see that my statements as to want of use of disinfectants to the faeces are correct. When visiting these places I have not seen a grain of quicklime, or a drop of carbolic acid, or any other disinfectant used to treat the excreta, and from what I learned by examination of attendants it is only by the merest chance that Jeyes' Fluid ever finds its way into the soil-pan.

"Full statistics, such as I understand Mr. MAY has procured, would help very much to arrive at an accurate result. I would suggest that some one with a little spare time should 'plot out' the figures of the severe plague localities upon a map of the City, and then have the position of the latrines inserted. This will go to prove what I have indicated above. Of course, where so many cases have occurred in the infected areas, it would be unwise to lay this down as absolute, it is only suggested to me from what I have particularly noticed to the west of the Civil Hospital. There may be a few exceptions with regard to the spread of disease by latrines, and some houses seemed to have escaped in a remarkable manner, possibly owing to some trade peculiarity, etc.; but with full statistics it may be found that even those which apparently have had no case have really been infected, or, more probably still, their inhabitants had fled before being attacked by the epidemic.

"If it is His Excellency's desire to have further details I shall furnish them if I can.

"In conclusion, please bear in mind that I do not say this is the *sole* cause of the spread of plague, it is *one* cause, and one that ought to be remedied at once in case we have another outbreak in the near future."

Further investigation in the infected area to the west of the Government Civil Hospital has fully borne this out.

EFFECT OF CLIMATIC INFLUENCE.

The disease commenced here at the end of the dry season; it had raged furiously in Canton during the dry season; and increased here after the rain set in. It was raging at Canton when the temperature was about 60° F. and in Hongkong when it was between 80° and 90° F. These facts show that at any rate between a temperature of 60° and 90° F. the epidemic will flourish and that the humidity or dryness of the atmosphere has not much influence on its forward march. Experimentally the bacillus grows best in a slightly moist medium at the temperature of the human body, and from this experience a humid condition of the soil and atmosphere would favour the propagation of the disease. It must be kept in mind that the great breeding ground for the germs is in the human body, a fact which is often forgotten by people who wonder how the disease is propagated and speculate as to the effect that different temperatures and humidity have upon it. As a matter of fact it follows that conditions of temperature and humidity approximating to those of the human body are favourable to the multiplication of the bacillus.

It has been suggested that the increase of the disease after the rainy season set in was due to the rise of subsoil water in the more or less porous ground causing the expulsion of ground air (more or less polluted from contact with soil infected by leaking drains) through the unpaved floors of dwellings, but I lay

most stress on the fact that the heavy rains drove coolies and others into the infected houses to sleep instead of sleeping in the street as they generally do in the summer when the weather is at all good.

MODE OF INFECTION.

The poison is given off in the faeces, in the blood and in the contents of buboes. Skin to skin infection is impossible unless the one to be infected has some wound and the infector's skin has been soiled by faeces, blood or the contents of buboes. The poison is not given off in ordinary respiration. Cultivation experiments with, and microscopic examination of, sputum and saliva have given negative results in the only case in which I have been able to work on this point. The question of whether the bacillus is present in the vomit has not yet been solved. Dr. KITASATO does not at present think so, but seeing that animals feeding on bits of plague buboes contract the disease, I think it better to give a guarded opinion upon this point. That the bacillus may live under certain conditions in the stomach is evident; what these conditions are I cannot state, but in an unhealthy stomach with great decrease of gastric juice it is quite possible for the bacilli to live and even multiply.

Infection takes place by inoculation, inspiration, and introduction into the stomach. The latter is infrequent. In this epidemic the relative frequency of the two first mentioned channels could not be made out, and indeed it would be difficult at any time to determine, as in cases of inspiratory infection the primary bubo noticeable may be situated in any part of the body, whilst a scratch on the hand or foot which may be thought the primary wound is often an after result of an injury unimportant at incipience. Most of the coolies affected wore neither shoes nor stockings; almost all males go barefooted which would partly account for the large number of the coolie class being affected. The better class of Chinese, though living under almost identical sanitary conditions, generally wear shoes and stockings.

Infection from bodies found in street or houses or awaiting burial may take place if clothes, etc. have been soiled by discharges.

Infection by flies and mosquitoes is improbable as no attendant in Hospital, although frequently bitten by these insects was affected. No bacteriological examination of mosquitoes or flies was made.

INCUBATION.

The incubation period may extend to nine days; it is, however, generally from three to six days. How short it may be I do not know, but I should say that a few hours' incubation period is very improbable. Case I. had an incubation period of between one hundred and two and one hundred and thirty-eight hours. The first batch of soldiers who were affected were seized with fever three-and-a-half, four, and six-and-a-half days respectively (after cleaning out some badly infected houses), while another soldier had an incubation period of four days. Of course these dates may be wrong as far as incubation is concerned, as they might have been infected at any time during these days but at any rate the evidence is significant. The limit period was in the following case. A Chinaman, MAN CHOY, was arrested on June 11th and put in the Police Cells during the day. He was sentenced to imprisonment in Gaol on 12th June, and on 20th June in the evening, after having complained of not being well and being under observation for two days, became feverish, and was removed to Hospital. The following day (21st) a left femoro-inguinal bubo appeared. This case gives an incubation period of nine days and is very important. There were many cases where an incubation of between three and six days could be proved, at least so far as one can speak of proof when eliciting evidence from Chinese. The Eurasian Italian Convent Sister who died from plague had an incubation period of five days.

The matter may be summed up as follows, the incubation period is generally from three to six days, is seldom under three or over six, but may reach nine.

CLINICAL.

Before describing in detail the clinical aspects of the bubonic plague it may not be out of place to give a brief description of the condition in which we found the sufferers during the early weeks of the epidemic. In those days, very naturally, cases were discovered in a more advanced stage of the malady than later, when house-to-house visitation was well established, and hidden sufferers were less frequently found. To overpaint the pitiable surroundings associated with plague work at the commencement of the epidemic would be impossible. I have entered

a long low cellar, without any window opening, and with the air entering only by a square open shaft from the level of the roof three or four stories high. Down one side of the shaft ran a broken earthenware drain pipe, leaking freely, the contents streaming down the wall of the air shaft to a shallow pool of filth which crossed the undrained floor of earth. Although it was broad daylight outside a lantern was necessary to see one's way. On a miserable sodden matting soaked with abominations there were four forms stretched out. One was dead, the tongue black and protruding. The next had the inuscular twitchings and semi-comatose condition heralding dissolution. In searching for a bubo we found a huge mass of glands extending from Poupart's ligament to the knee joint. This patient was beyond the stage of wild delirium. Sordes cover the teeth and were visible between the parted and blackened lips. Another sufferer, a female child about 10 years old, lay in the accumulated filth of apparently two or three days, unable to speak owing to the presence of enlarged cervical glands. The fourth was wildly delirious (the conjunctivæ intensely congested) and was constantly vomiting. The attendant (*sic*)—the grandmother of the child—had a temperature of 103° F. and could only crawl from one end of the cellar to the other. She was wet through, and was herself doomed. This is no fancy sketch but a true picture of how we found some of our patients at the outbreak of the scourge in Hongkong. No one, unfamiliar with the horrors of some coolie accommodation in China, could credit "how the poor live" in Hongkong, or could imagine how the horrors of their everyday life were intensified by the plague.

The terrors of the disease itself were rendered greater by the fear the poor wretches often had of falling into the hands of the "foreign doctors." It is no great credit to our boasted civilisation or to our vaunted mission work that the average intelligent Chinaman of to-day prefers the fetish tricks of the native practitioner to the more enlightened methods of graduates of the western schools; but the fact remains that the horror of western medicine is by no means confined to, though almost universal among, the members of the coolie class. So evident was this fact that it was deemed prudent to allow such sufferers as preferred their own native doctors to be attended by them, in hospitals under European supervision.

Face to face with a hundred difficulties, accentuated by the natural suspicion and ignorance of the Chinese, whom as far as possible we wished to appease, naturally short handed as far as medical men were concerned (for the visitation gave us little warning and spread with alarming rapidity), the difficulties the executive had to combat were grave in the extreme.

Wisdom after the event is a proverbially cheap attribute, and doubtless there are many people who possess it. We hear, now that the immediate strain and danger have passed, how very much more satisfactorily things might have been done, principally from people who did little or nothing to help us in the hour of our extremity. We hear of wisecracks who knew that the plague was here many weeks before it arrived, but who kept such valuable information strictly to themselves, in the interests, doubtless, of the community. Rash and inaccurate "first thoughts" have found their way into the British journals, and crude guesses have appeared in print under the false guise of "methodised experience." It will be prudent for plague students to accept very guardedly such early lucubrations. No man who really saw the plague in its early days had time for recording in a trustworthy way its often varying phases, and at that time sound clinical record was almost impossible. Later on in the light of a quieter time, and a more leisurely observation there was time to expunge as error that which at first was not unreasonably recorded as fact. We constantly laboured under the difficulty of not being able to speak the language of our patients, and such a condition of affairs was not only more or less alarming to them, but greatly against our treatment throughout. Of course, we had attendants who were able to interpret, but an interpreter is an unsatisfactory necessity by the sick bedside, and often helps to confuse a sufferer, whose intelligence *ab initio* is none too clear, and whose approaching delirium dissipates coherency.

The sick person may be said roughly speaking to present upon first being seen many varying aspects. Sometimes the patient is brought in, in a condition to demand very careful diagnosis before committing him to a plague ward. There may be only general malaise with a temperature of say 102° F., a tongue somewhat coated, an anxious, sometimes terrified, expression, a quick small pulse (more or less the result of shock and fear), and a general feeling of aching over the body. Such symptoms of course may be the result of a dozen different pathological conditions and caution is needed. Another case may have the injected conjunctivæ and high fever which forerun the stage of delirium and here the bubo is as a rule

easily found. Most cases aided diagnosis, in the first month of the visitation, by having well marked buboes upon admission to hospital. Sometimes the conjunctivæ show marked bile staining. It will not do to accept a bubo as indisputable evidence of plague—bear in mind that lymphadenitis is not eliminated from human ills at a time when the bubonic plague is in evidence and that in lymphadenitis (associated say with a wound of the foot) you may get your fever, pulse, general malaise and bubo in the most common site of bubonic plague selection. One or two such cases were sent to us during the recent epidemic. Sometimes an individual may not know he is suffering at all. In one case I took the temperature of an Indian who looked ill but who had come to see about the burial of a compatriot, and who complained of no unpleasant symptom, but was rather amused at my using the thermometer in his case. He had a temperature of 103° F. and a small cervical bubo. In the wards he had a very grave attack and only just missed joining his friend whom he had come to bury.

The facies of a plague patient has been variously described by classical writers. Shortly it may be put down as a mixture of anxiety, cyanosis and dyspnoea until the first mentioned is overcome by the nervous symptoms; whilst the character of the gait depends solely on the state of the cerebral system.

Generally speaking there is something indescribable in the face of the plague stricken which seems to help your diagnosis, an expression as if the sufferer himself knew all about it, and his inner consciousness had left its mark on his features.

Temperature attracts notice early. It rises, as a rule, gradually and not suddenly as it does in malaria. In most of the European cases and in the Japanese doctors, who were watched from the beginning, it took from twelve to thirty-six hours to reach the primary maximum. This primary maximum in the early part of the epidemic was generally from 104° to 106° F., a temperature of 106° F. being frequent. As time went on this seemed to fall to 105° and later still a temperature of 104° was seldom reached in the first stage. At the beginning of May the period of pyrexia due to the disease itself was somewhat longer than it was about the end of June, whilst in August it was shorter than it was in the middle of the epidemic. Secondary complications often keep up the temperature for a fortnight or even longer after the acute stage of the disease has passed. I am now speaking of cases that recovered. In most severe cases the tendency is for the temperature to keep about the same level for some time. In milder cases a gradual (sometimes only slight) fall takes place; most recovering cases show a well marked morning fall and evening rise. The temperature may fall by lysis or crisis—the latter being very rare. Antipyretics generally affect the temperature very slightly, and in looking at some of the charts, although falls of 2° or 3° are sometimes noticed, still the majority of cases show very little fall. In some cases where a large fall (say of four degrees) was brought about the fall was coincident with approaching death. During the first month the highest temperature on admission was 106.6° F. The highest temperature noted in this period was in a child *æt.* 5 years on the third day when it reached 107.4° F. During the second month our highest temperature on admission was 106 and highest reached 106.4° F., but only five or six others were noted above 105° . The highest temperature recorded in the epidemic was 108.8 in a child.

Well marked rigor at the commencement of the disease was conspicuous by its absence, in many cases the first thing that attracted notice being the headache due to fever. Many cases complained of a slight shiver or chilliness. In connection with the absence of marked rigor it is interesting to note that in Hongkong malarial attacks have frequently no cold stage at all. Previous records of the disease make the rigor generally well marked.

The *swollen glands* that were apparent most generally affected the femoral chain in Chinese as well as in Europeans. In Chinese, infection by inoculation was frequent owing to coolies going barefooted. All the Shropshire Regiment men infected had femoral or inguinal buboes, and they were well booted; so that there must be some reason for the femoral glands being especially liable to enlargement. However, seeing that the disease often causes a general enlargement of glands, I think that the mere point as to which set of glands is usually enlarged has been made too much of; more especially considering that sometimes the biggest gland is situated in the abdomen out of sight until the *post mortem* examination is made. The pain in the bubo was very great at first; later on it became less; and finally towards the end when no apparent swelling was noticed it was only occasionally, on considerable pressure over some of the most generally affected regions, that what might be termed a “differential pain” was discovered. Sometimes pain was noticeable a considerable time before the enlarged gland was noticed. At the commencement of the epidemic the noticeable buboes were very large and as the epidemic

went on their size gradually diminished. Although pain and size generally went together, frequently a small gland was to be met with which would be as painful as a very large one. At the commencement of the epidemic the bubo was *always* surrounded by a considerable amount of sero-sanguineous exudation, and as time went on it was found that this diminished also, the end of the epidemic showing very few cases which had any exudation at all. Sometimes there was a very large amount of œdema around the bubo quite distinct from the sero-sanguineous exudation around, and a "doughy" feeling could be detected in the bubo during the course of the first twenty-four hours, probably due to the rapid pouring out of exudation. Femoral buboes as a rule were most painful, parotid swellings standing at the same level. Those situated in the axillary and cervical regions did not cause so much discomfort, unless in the latter region the swelling reached close to the trachea or the mastoid cells. The abdominal pain was I consider in some cases due to inflammation of some of the mesenteric glands. In the case of the Italian Convent sister who died this was undoubtedly the case, as the slightest pressure over a spot on the left side of the umbilicus caused great pain, and immediately under this spot the only well marked enlarged gland in the abdomen was found at the *post mortem* examination. This is interesting when one considers the question of sensibility of the peritoneum.

The bubo when present generally appeared within 24 hours of the onset of the fever. In two or three cases we got a history of the bubo appearing before the fever, but as a thermometer had not been used I place some doubt on the accuracy of the statements made. In numbers of cases the swelling did not appear till later, in one case not till about the ninth day of the disease when the temperature suddenly dropped, and the case became rapidly convalescent. In another case it appeared on the sixth day and the disease still continued to run an acute course. In a few cases where a small bubo was present for four or five days a sudden enlargement was noticed and the patients rapidly sank. This was especially marked in three cases with cervical buboes. I ascribed this mostly to the sudden extension of the swelling to the larynx. From the rapid way in which the pulse and respiration became worse in these cases, however, it is quite possible that interference with the pneumo-gastric and phrenic nerves may have been the immediate causes of bringing about a suddenly fatal issue. I formed the opinion that a sudden enlargement of a bubo, after having been practically stationary for some time, is of grave portent.

Sometimes a whole chain of glands was enlarged; when this was so, if the patient survived, widespread sloughing was to be anticipated later. On two or three occasions on the *post mortem* table a large hæmorrhagic mass of glands was found running from the apex of Scarpa's triangle to the bifurcation of the abdominal aorta. The question as to whether the bubo was a true suppurating one was raised, one medical man being of opinion that an opening, (although made on account of supposed suppuration), was made too soon, and that suppuration was the result of incision. This had to be disproved more or less to his satisfaction. The Chinese Hospital (Slaughter House) contained patients on whom a knife was never used, — one morning we counted 43 patients there. Of these, 34 had buboes that had suppurated and burst of their own accord, some of them having caused serious sloughing. An immediate small rise in temperature often followed the incision of a gland, even when pus was evacuated.

Cerebral symptoms appeared early in the disease. They were due to two causes principally (*a*) meningitis, (*b*) hæmorrhages. Headache began with the fever. It was generally fronto-temporal and most severe in the early cases. I may say here that all symptoms of the disease seemed to be more acute at the beginning of the epidemic than they were later. The headache was generally a combination of an acute dull pain accompanied by throbbing in the temples. Sometimes (rarely) a patient complained of occipital headache and, on one or two occasions, of pain in the back of the neck — evidently of spinal origin. The headache gradually merged into delirium as the meningitis developed. Convergent strabismus or divergent strabismus was occasionally present — generally the former. "Both eyes turned to right or left" was also noticed in some cases. Occasionally where hæmorrhage was diagnosed the pupils were unequal but in one conspicuous case where a hæmorrhage on one side of the brain was supposed to exist (diagnosis concurred in by Professor AOYAMA), no hæmorrhage was found and I think that in many cases the mere meningeal inflammation caused symptoms which would lead one to suppose that a one-sided lesion was present. Cases generally developed brain symptoms which could be differentiated into four distinct types:—

- (*a*) Comatose, where the patient lay practically paralysed, mind and body.
- (*b*) Wildly delirious, where he struggled and fought and still retained a fair command of rational speech.

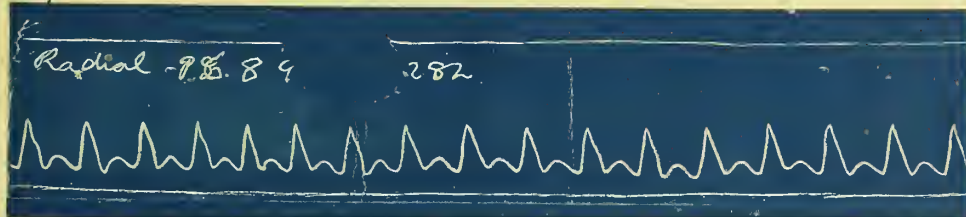
- (c) Apathetic. where he lay perfectly quiet, and took nourishment when it was offered to him; in fact lay in a drowsy, but always more or less conscious, condition until improvement or death took place.
- (d) A convulsive type brought on either by the inflammation of the meninges and brain matter or by a hæmorrhage. These convulsions were often severe. (In Case I. they were only stopped by chloroform. P.M. no hæmorrhage was found.)

In Case XV. they always began in the left arm (hand) and were truly Jacksonian in nature pointing to some cortical lesion round the right fissure of Rolando. (See remarks on case.) Occasionally they resembled tetanus, the opisthotonos being very great. Subsultus tendinum did not occur early as a rule, but generally late in the disease. Picking at the bed clothes, trying to catch imaginary objects, in fact all the symptoms of meningitis were almost always present; in a few cases however they were absent, and such cases were usually of a very mild nature. Patients often had hallucinations beginning generally on the second day of the illness. All these cerebral symptoms followed the primary lymphatic affection and their rapid appearance was not to be wondered at when one considers the close connection between the arachnoid and the lymphatic system.

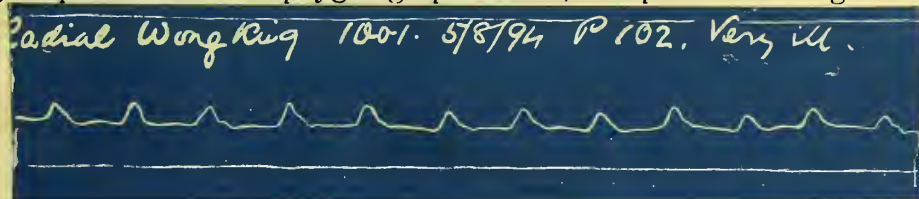
The *vascular* is the other *system* which was especially affected. The principal items to note were—

- (1) The vasomotor paralysis which rapidly appeared involving the heart itself as well as the vessels.
- (2) The liability to sudden heart failure.
- (3) The symptoms probably due to organic changes in the heart in those who recovered.

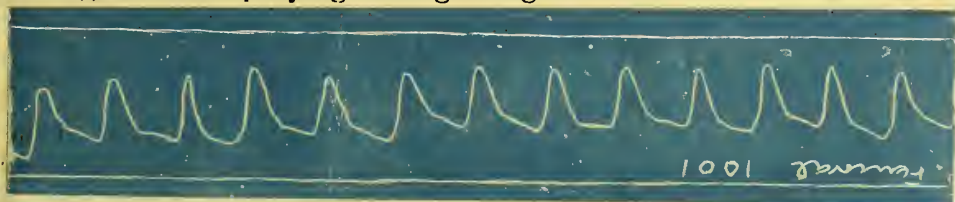
There are four stages of the pulse in plague. During the first stage it is in the majority of cases full and bounding. In some it is feeble and collapsed. When in the latter state cyanosis is usually well marked and the patient is evidently moribund. The pulse which at first is full and bounding becomes (usually in from six to thirty-six hours) dicrotic and fairly easily compressible at the wrist. The accompanying tracing shows such a pulse where the dicrotism, although not extreme, is well marked.



Intermittency is often noticeable in this second stage of the pulse and becomes more marked as the third stage develops, when it becomes anacrotic and almost like the pulse of aortic insufficiency, there being no rebound wave at all, nor the slightest trace of it by sphygmograph in a well marked case. In addition it is at this period very easily compressible, and the actual range of movement of the vessel is very limited at the wrist, whereas in the larger vessels the upheaval is usually well marked, slight pressure at the femoral being sufficient to arrest the pulse. The following tracing of the radial pulse is taken from a patient at this stage, there being no pressure on the sphygmograph button, except its own weight.



This patient was a very lean man, and consequently a tracing of his femoral pulse could be easily obtained as the vessel passed over the brim of the pelvis. With slightly over an ounce of pressure, (enough to visibly diminish the range of movement), the accompanying tracing was got.



From this anacrotic stage gradual or sudden failure may set in, unless there is a general improvement in the case. The pulse generally becomes fast and running and scarcely perceptible or if perceptible it is generally intermittent. On the second day if a thin patient was naked one could usually see the femoral arteries beating at a distance of several yards, and this was equally true of the other large arteries. Often this large movement was to be seen in the vessels in the neck, axilla, or groin, and yet at the radial or posterior tibial arteries the pulse was hardly perceptible.

These four stages of the pulse (1) full and bounding (2) dicrotic (3) anacrotic (4) failure, may be looked upon as the usual sequence; though one or more of them may under some circumstances escape observation. They may all be of the shortest duration, and of course sudden heart failure may at any time prevent the later stages developing.

The area of cardiac dulness was generally enlarged early in the disease (apex downwards and to the left of usual position) and sometimes remained so for weeks in those who recovered, there being also an increase of dulness on the right side. There was practically no muffling of the sounds. These conditions pointed to dilatation, yet murmurs were of rare occurrence. One would have expected to hear them more frequently even in those who were long sick and recovered. The first sound was invariably weak in the later stages. Pain in the cardiac region was generally complained of. These symptoms pointed to a true myocarditis. Palpitation was frequently present and complained of. A pericardial rub I never heard, although in a few cases *post mortem* a small accumulation of fluid was found in the pericardium. I think that the tendency to hæmorrhage must have been caused by some inflammatory or fatty degenerative change in the small vessels, and this may be one of the reasons why digitalis was so frequently a failure. It is to be expected that the microscopic pathology of the disease will be written by ΑΟΥΔΑ at some future time.

When blood was drawn from the finger tip it was found to flow more easily and to look more fluid than normal. When put under the microscope it was found that the corpuscles crenated rapidly, and did not run into *rouleaux* readily. The number of leucocytes increased always when the disease was at its height, and in the later stages there were occasionally to be found broken down or badly formed corpuscles. The number of red corpuscles was not materially diminished until the 7th–10th day when convalescence was setting in. The amount of hæmoglobin in the blood commenced to diminish from the second day of the disease, and, in some cases, became very low. In Case I. it was as low as 18 % of the normal quantity, but in this case the patient was always somewhat anæmic. A diminution to 30 % was frequent. The bacteriological examination of the blood will be discussed later.

Digestive System.—The important symptoms in connection with this system are—(i) condition of mouth and fauces; (ii) vomiting; (iii) diarrhœa or constipation. The mouths of Chinese patients were invariably dry from the commencement, and the teeth and lips were early covered with sordes. The tongue was at the beginning of the attack almost covered with a thin white fur which became thicker, and then went through a transformation from white to black. In the early stages it was very like a typhoid fever tongue—white fur with red edges and tip,—but in plague there was little or no tailing off of the fur as it approaches the edges, and the edges were not of such a bright colour as is generally the case in enteric fever. As the disease advances the fur changes from white to yellow and brown, dark-brown and black. The latter colour is confined to the middle part of the organ, toning down towards the edges which still retain their original colour, in fact like a heavy tobacco chewer's tongue dried up. The edges get somewhat redder as the disease goes on. The tongue is protruded with difficulty, the cause of this evidently being the cerebral condition, or possibly pain in the cervical glands. In Europeans, tongue conditions were never marked, owing to nourishment being taken often, and to the frequent use of the toothbrush. In the opinion of some people the dry condition of the mouth was the cause of the tongue not being easily protruded, but I consider this is a very minor cause. The fauces and pharynx were generally somewhat injected, and the tonsils somewhat swollen. When the principal bubo was situated in the cervical region, (especially if affecting the anterior cervical glands,) the tonsils and pharynx were usually intensely congested from the spread of the glandular inflammation.

Vomiting usually came on early and was of a bilious nature, being at first greenish, but going on to a dark-brown colour, almost grumous. Hæmatemesis was exceedingly rare during the epidemic. The question arises whether the dark grumous material vomited was not blood altered by stomachic causes. I do not think that this is so because in these cases, (if efficient treatment was not adopted), the vomiting was sometimes constant, and pure or almost pure blood would necessarily have been vomited much more frequently. The vomit was generally of the same colour as the bile found in the gall-bladder *post mortem*. The vomiting generally disappeared after counter irritation and a dose of calomel had been administered, and a free evacuation of the bowels secured. Where calomel was given early this troublesome symptom very seldom appeared. Under the care of native doctors vomiting was much more frequent than in our hospitals, and this I ascribe to want of purging, and also to the horrible concoctions of medicines and food which they forced down their patients' throats. Considering the cerebral condition of some patients it was to be expected that vomiting and retching would be frequently met with; but after the above explanation and taking into consideration the fact that the vomiting did not show the ordinary cerebral characteristics, I think that this symptom must be put down as mainly due to the condition of the liver and bowels. The feeling of oppression, and sometimes burning, in the epigastrium was due partly to the stomach trouble, but mainly, I believe, to cardiac conditions. Hiccough was often distressing, but the first dose of morphia generally stopped it.

Constipation was the general rule, though diarrhœa was met with in a number of cases and might be classed as (*a*) slight looseness of the bowels; (*b*) severe diarrhœa. Many cases of slight diarrhœa did very well, in fact I put it down as a favourable symptom, but then it only appeared in what seemed to be milder cases. Severe diarrhœa need not necessarily be a bad symptom. As a rule when severe it was very fetid and evidently due to an acute enteritis. There was sometimes considerable straining with it resembling dysentery, but in only one case in the epidemic in our hospitals did I see blood in the evacuations, and then it was dark in colour, no bright blood as is often found in dysentery, and had evidently come from some distance up the bowel. Pain over the liver was never complained of, pain over the spleen on a few occasions only; pain in the abdomen was due possibly to one or more swollen glands, or may be ascribed to colic, or frequently to distension of the bladder. Enlargement of liver and spleen was only occasionally made out by palpation and percussion.

Respiratory System.—Dyspnœa was a constant symptom and was due to a combination of causes:—(*a*) œdema of the lungs brought on by the vasomotor paralysis and possible changes in the small vessels; (*b*) the febrile state, and loss of hæmoglobin; (*c*) cardiac. It was of an anxious and distressing character, coming on early in the disease with rapidity of respiration; the *alæ nasi*, however, were soon at work and the respiration became more rapid still. The dyspnœa was more of a pneumonic than of an asphyxiative type. Physical signs of hypostatic mischief were seldom well marked before the third day of illness, and even then was only so in the severe cases. Some cases got well in whose lungs no moist sound was ever heard, but I am bound to add that many a one died with precisely the same condition of affairs, *post mortem* examination always showing some congestion at the bases of the lungs. Cough was generally absent in the early stages of the disease; or if present was evidently caused by the œdema of the lungs, and was then of a short and irritating character. Many cases showed œdema of the lungs without cough. These were generally rapidly fatal, the patient becoming comatose as the lungs became choked up. In a few cases the œdema went on to acute pneumonia and pleurisy, but this as a rule was only seen late in the disease. Pleural effusion was seldom marked enough to diagnose before death. In some cases multiple pneumonic abscesses—undiagnosed—occurred.

Among Chinese the voice in almost every case—even where the patient was sensible—was very weak; it was not so as a rule with the Europeans whose lung power and larynxes were always in a much better state than those of the natives. Laryngitis when occurring was generally the result of extension of cervical glandular inflammation, and at the end of the epidemic, when these glandular inflammations were of an extremely mild character, laryngeal mischief was not met with at all.

Affections of the *urinary system* were practically limited to a slight and transient albuminuria. This was always slight, a trace to 1/20th being the common report on the charts. A larger amount I never saw. Hæmaturia was not noticed amongst our cases. Retention of urine was frequent and, notwithstanding every attention to cleanliness, cystitis developed on several occasions where frequent catheterisation was necessary. Unconscious urination at the beginning of the epidemic was also

frequent, generally coincident with incontinence of feces if the bowels were at all loose. Urine was generally dark coloured and of high specific gravity, with increased secretion of urea. I noticed no casts in the urine. Sometimes the apparent incontinence in the Chinese Hospitals was due to distention of the bladder.

SKIN.

With two exceptions (urticaria and a herpetic eruption) which were only coincidental no rash was noticed, (but *vide* Case XXII.). The skin was dry and, pungently hot, except in collapsed cases when it was cold and clammy. After the acute stage of the disease perspiration in most cases was marked. The question of the occurrences of hæmorrhages should be considered in conjunction with the *post mortem* appearances of organs where hæmorrhages have occurred. At the beginning of the epidemic almost all the Chinese showed small red spots about the size of a pea. When I was in Canton and enquiring about these spots a Chinese coolie volunteered the information that they were the result of insect bites, generally mosquitoes and flies. I think I am giving a guarded opinion when I say that 95 % of these spots seen during the epidemic were caused by mosquitoes or flies. The condition of the blood was such that the slightest scratch or injury was generally followed by a dull pink blush appearing round it. On incision it was found to be composed of a small extravasation of thin light coloured fluid blood. All the hospitals except the *Hygeia* were swarming with insect life which we could not get rid of, although thousands were slaughtered daily by fly-papers and other contrivances. In almost every case the spots appeared on the exposed parts, ankles and feet, wrists and hands and face. On the *Hygeia* patients received at the commencement of their illness scarcely ever had a single spot and there were no mosquitoes on board and few flies. A puncture with a pin or a trivial blow or excoriation was often followed by the characteristic discoloration a few days later. The Chinese method of pinching (as a counter irritant) caused wonderful appearances on the chest and neck, the whole of this region of the body being sometimes of a colour varying from dull pink to dark violet. Mosquitoes, flies, etc., are very numerous all over Hongkong and the dead bodies which were picked up in the street showed the same spots. I never saw one of these spots above the size of a five-cent piece (the same size as a blister caused by a mosquito bite). In Kennedy-town Hospital, where patients had their pyjamas properly fastened, these spots were almost invariably confined to the exposed parts of the body. I never saw a hæmorrhage in the skin anything like those seen in purpura, which are darker in colour, at least in the centre. All these plague marks were small and dull pink in colour. One day they appeared as typical mosquito bites, the following day they looked like hæmorrhagic spots.

The word "Carbuncle" should be expunged from plague literature as I take it that "Carbuncle" when used in this connexion is meant for a hæmorrhagic blister, or a bubo in the neck, several of which looked like carbuncles but were really glandular in character. These were seen in only a few cases (four I think of the early cases). A true carbuncle was never seen. Boils were several times met with during convalescence as a result of the debility caused by the disease, and differed from the ordinary tropical boils common in Hongkong in that the pus was thinner and that there was no true core or slough, whilst an inflammatory areola of redness was seldom present,—in fact they ought to be called multiple abscesses rather than boils. In one case true boils occurred early. In one bad case of multiple abscesses, necrosis of several parts of the skull took place.

Hæmoptysis was very rare, only two cases (on the *Hygeia* and at Kennedy-town hospital) being serious. Hæmatemeses and Melæna were equally rare.

Bleeding from nasal or buccal mucous membrane was noticed several times early in the epidemic. Hæmaturia was never noticed. Hæmorrhage into the conjunctivæ was noticed in a few cases. Two cases of hypopyon came under observation.

In speaking of hæmorrhages into the conjunctivæ as being occasionally seen it must be noted that congestion of the conjunctivæ was very general at the onset of the acute cerebral symptoms.

Every pregnant woman brought to hospital aborted. All died with one exception. Contrary to what one might have expected none died from uterine hæmorrhage, but evidently from the virulence of the disease. In the cases I saw the uterus had contracted well. Hæmorrhage from the genital canal was noticed in a few instances, notably in the case where hæmorrhagic endometritis was found *post mortem*.

The following list gives the numbers of those who had apparent hæmorrhages in the Government Hospitals. It is possible that one or two more should be on

the list, as our Wardmasters could not be expected to note it in cases where the patient came in through the night and died before the doctor's first visit in the morning. Out of about 450 cases there was *Hæmatemesis* in 7; *Melæna* 4; *Hæmoptysis* 4; *Epistaxis* 2; *Hæmorrhage* from Gums 1; *Hæmorrhage* from Vagina 2; *Hæmorrhagic Blebs* 3; *Hæmorrhage* into conjunctivæ 2. Of these 23 cases 18 occurred in May, so that it is evident that hæmorrhages were most liable to occur when the disease was most virulent in its epidemic form.

The course of the buboes after formation was one of four: (1) early resolution, (2) lengthened period of enlargement, (3) suppuration, (4) sloughing.

Early resolution may take place though it was only seen in some mild cases where the glandular enlargement was slight. Lengthened periods of enlargement occurred in several patients in the Slaughter House Hospital (under native doctors) where the swelling did not go down even after two months in hospital. An indurated mass sometimes remained on which iodine, mercury and other usual remedies had very slight effect. One of our patients (who was afterwards retained as an attendant) had a glandular mass remaining at the end of four months with practically no change in size or consistence. If the patient survived, suppuration was the most frequent termination during the first two months of the epidemic, either alone or combined with sloughing. If the glandular mass was very large there was generally a slough, caused by the surrounding inflammation and suppuration, which was vividly described by a Chinese nurse as a "mixture of boiled cheese and thread." If the bubo was small it generally terminated in simple suppuration without the separation of any decided slough. Sometimes great necrosis of skin and superficial tissues occurred over the buboes, and the proximity of femoral buboes to the femoral vessels had a tendency to make one over-cautious with the knife. In the case of ALLEN the bubo took six months to heal up, the glands along the iliac vessels having evidently been enlarged, and giving the greatest trouble after suppuration.

Lymphatic abscesses may develop along the line of the lymphatic vessels. This was especially marked in the case of AOYAMA.

For a long time after the acute phase of the disease was over the tissues remain in a very low condition, incisions taking a long time to heal, there being often no appearance of the epidermis growing over an ulcer for weeks. The granulations remained flabby and unhealthy, and there was a well marked line between the granulations and the skin, with no attempt at growth of epidermis over the ulceration.

The presence of bacilli in the blood being a most important symptom I make no excuse for describing it fully, so far as it is necessary for diagnostic purposes. Examination is very easy when one has observed an expert at work, but it is only by attending to every little detail that easy and satisfactory examination can be carried out. Take care to have good clean cover-glasses and slides (we were bothered here very much by having on hand cover-glasses which had become hazy from climatic influences). Cleanse the finger tip with alcohol; allow the alcohol to evaporate; constrict the finger with a small strip of lint; puncture the finger with a pen-nib from which half of the nib has been broken off and which has been sterilised in the flame of a spirit lamp. With a sterilised platinum point smear a very little blood in a fine layer on the clean cover-glass. Four or six cover-glasses are generally prepared as the bacillus may not be discovered in a solitary preparation. The moment the cover-glass is dry pass it three times through the flame of a spirit lamp with the blood-side away from the wick. See that the flame is a spirit flame and not merely a burning dry wick. Do not wait hours before passing the cover slip through the flame as then the specimen will generally be found useless. After passing through the flame the staining and examination can take place practically at leisure.

Dr. KITASATO found fuchsin the best stain for the bacillus while Dr. YERSIN used gentian violet. It is all a matter of taste I believe and what one is most accustomed to. Personally I find examination may be prolonged with more comfort to the eye if gentian violet be used or even methyl blue. Fuchsin is the best stain if only a few preparations want examination. The staining fluids ought not to be too concentrated. Place a few drops of the stain on to the cover-glass preparation. This is better than floating it in a watch glass, being easier and wasting less stain (a matter of consideration in Hongkong). If of methyl blue, at once turn on to a slide, compress the preparation between a couple of layers of blotting paper without "fluff" on it, and the specimen is ready for examination. If fuchsin or gentian violet be used a period of from three to five minutes should be allowed for staining (according to the depth of the colour of the solution) and then the cover-glass should be washed with distilled water and placed on the slide and dried in the same way as above with blotting paper. If the specimen is to be kept the

water should be slowly evaporated *above* the flame of the spirit lamp, and mounted in Canada Balsam which has been heated for a few seconds after being on the slide. Then examine with a 1/12th inch oil immersion. The bacilli are often few and far between, but it is of the utmost importance that a careful examination be made in cases where no glandular swelling can be felt and where the diagnosis is doubtful. During the latter part of the epidemic about 80% of the cases were diagnosed by the microscope alone, involving many hours' labour a day on what to most people is not interesting work. Once the bacillus is found the case is one of plague. Should the bacillus on the other hand be absent it does not necessarily follow that it is not plague. On one or two occasions we had to wait for the *post mortem* examination to give us the cause of death. I put a hypodermic needle into the spleen (where the bacilli are generally abundant) in order to verify the diagnosis of one case. If a case is diagnosed plague then this examination completes the chain of evidence. In the case of a bubo which may or may not be a plague one it is advisable to take the blood direct from the gland, by a hypodermic needle or through a small incision with a tenotomy knife. These details are well known to bacteriologists, but unfortunately every one is not a bacteriologist.

For diagnostic purposes it is sometimes necessary to get a culture on agar-gelatine or blood serum. This has to be done in the most careful manner, as far as precautions are concerned, in order to get a satisfactory result, for it is to be remembered that in out-of-the-way places where plague may develop it is not always easy to obtain agar-gelatine or blood serum and even if obtained it is a tedious process to get them properly sterilised. Other points on the bacillus will be touched upon later; what has been written is enough for symptomatic or diagnostic purposes.

DIFFERENTIAL DIAGNOSIS.

When diagnosis has been reduced to a question of microscopic examination there cannot be much to be said upon the subject. The only difficulties we had in determining cases, previous to Dr. KITASATO's discovery, were with bad malarial fever cases, lymphangitis with irritative bubo of leg; one or two inflamed glands of the neck, and enteric fever. As regards intermission of temperature I cannot bear out CABIADIS' statement that no intermission occurs in plague. Intermissions do occur.

A case of mistaken diagnosis No. XII. is given which was diagnosed by us as not plague owing to the absence of head symptoms, and on account of other reasons which are given. Another case of mistaken diagnosis is given which, even before microscopic examination was made, we pronounced to be not plague, because of the absence of a symptomatic tongue, head symptoms, and the pulse usually met with in plague, and on account of the presence of another cause for the illness.

The question as to whether there has or has not been exposure to infection should weigh little or nothing at all during an epidemic of plague for there are many roundabout methods of infection.

One serious difficulty we had in determining the cause of death in dead bodies required for burial purposes, more especially towards the end of the epidemic. The mortuaries situated in different parts of the Colony had to be examined regularly every day, but as the very idea of *post mortem* examination had to be kept in the background, the difficulty of being able to tell fairly accurately whether a person had died of plague at once becomes apparent. If the Chinese had been allowed to remove their bodies, as they wished to do, it might have been expected that plague would break out in outlying places. It is to be remembered that in *Hongkong* the Chinese are allowed to exhume the dead after an interval of seven years; there was therefore all the more reason for getting every plague corpse buried in a special cemetery where exhumation was not to be allowed. Swollen glands were the first thing to look for, then sordes in the mouth, then the special appearance of the tongue. Often the bodies bore the typical "facies" of the disease after death. The occurrence of the pink blush round mosquito bites, with any hæmorrhages apparent, also helped to determine where the corpse should be interred. Microscopic examination of blood removed from the spleen will probably be the method of diagnosis in these cases in future. Typhoid fever is a disease possible to be mistaken for plague—*vide* Case XVI.

PROGNOSIS.

There is no one special sign that gives hope for recovery, whilst there are many that are decidedly bad, and which are valued according to the ordinary ideas of medicine. Buboes do not suppurate as a rule until the primary fever has fallen, by which time you know that the patient is better.

To imagine that suppuration is a good sign is to put the cart before the horse, the suppuration coming after the recovery from the acute stage of the disease.

I liked to see a patient with three or four copious loose motions per diem, not amounting to diarrhœa. As a rule this was often the patient who was not troubled with vomiting, and whose brain symptoms were not so severe.

In this as in other diseases a good heart, physically and morally, is the best thing a patient can possess.

TREATMENT.

Hospital Prophylaxis.—At the beginning of the epidemic every precaution that we could think of was taken to prevent the infection of attendants. Most of these precautions were useful and necessary, whilst others proved to be more in the nature of luxuries. As our knowledge and experience of the disease progressed we were able to bring down our requirements to fine lines. Plenty of fresh air was a *sine qua non*, both for patients and attendants. At first attendants were allowed to smoke as they pleased, and as a couple of rabbits died in two days, after inoculation by blood from our first case, nurses had strict orders to be careful of all wounds or scratches on their fingers, and to see that they were dressed with some antiseptic at once. They were ordered to use eucalyptus oil or carbolic acid solution on their handkerchiefs, more especially when the hospitals were crowded, but when a more plentiful supply of fresh air was forthcoming this was left off. Fæces were disinfected by quicklime or carbolic acid, as were all dressings. At the Slaughter House Hospital Jeyes' fluid was used as the disinfectant all along. If at any time the wards smelt badly from any cause, or the stillness and closeness of the atmosphere became oppressive, some eucalyptus oil evaporated over small lamps had a wonderful effect in alleviating the nauseated feeling that sometimes came over the attendants. In the beginning nausea was sometimes brought on by the cigars or pipes which were freely used, but as we gained experience this was all remedied.

All patients' clothes, being practically worthless, were burned on admission. Patients were given a hot bath, if in a condition to stand it; or were sponged down on the bed. Chinese who were not wildly delirious were placed on the ordinary Chinese bed and mat; but if likely to do themselves harm they were put on a mattress. Mattresses, pillows and mats were burned after being in use some time, the length of time in use depending on the amount of soiling. If we had had a more ample supply of mackintosh sheeting, a large one would have been put on each bed, as being by far the best way of keeping beds in a sanitary condition. One thing to be beware of is not to give purgative medicine to all new patients at the same time. Often when a number of patients had calomel after the evening rounds the nurses had rather a hard time of it the following morning, which delayed the routine work of the hospitals too much. Carbolic acid and permanganate of potash were of necessity freely used in the wards; blankets and sheets being frequently washed in a solution of the former. With the accommodation at our disposal attendants, when unemployed, were kept as far away from the hospital as possible, and plenty of soap and carbolic acid was supplied to them.

Any attendant, complaining of headache, languor, sore throat or fever was immediately relieved from duty. Only healthy people should be allowed to approach plague cases.

Prophylactic measures should consist in remedying the causes that predispose to the disease. During an epidemic personal cleanliness should be carefully observed by those who have any work to do which takes them near the infected district. In addition to the usual daily tub a bath should be taken immediately after coming out of the affected area, some disinfectant like Jeyes' fluid being used in the water. A change of clothes is essential, and those that are discarded should be removed immediately, and exposed to the fresh air. If it is no trouble they may be put through the steam steriliser, but it will be found that free exposure to air in the sunlight will be sufficient. With regard to those who are employed on cleaning or disinfecting houses the following precautions should be observed. Free smoking should be allowed. The workers should be warned about scratches or wounds on their bodies; and a medical inspection of them should be made every day; those with wounds not being permitted to do the dirty part of the work. Preferable to smoking would be the use of respirators with exit and entrance valves; and a sprinkling of thymol or menthol over the entrance valves. Professor KITASATO suggested oil of peppermint. If smoking goes on then a carbolic mouth-wash should also be insisted on. As regards stimulants, these should be dispensed carefully but not too freely, the nauseating character of the work in a dirty town sometimes suggesting a too occasional glass of whiskey or other alcoholic stimulant. Before

cleaning out houses the furniture &c. should be well washed with carbolic solution, by means of a hand hydrant, and cleaning should proceed whilst the furniture etc. is wet. After removal another good wash with carbolic or quicklime should take place. Chlorine will prove an efficient disinfectant if used in good quantity within a building, the doors and windows being carefully closed. Dirt and rubbish removed should be *at once* burned. The removal of the healthy from infected houses should be insisted on. They should be transferred at once to some outside encampment. When it is realized that the floating population of Hongkong practically escaped scot free it is a matter for regret that a suggestion made by Surgeon-Major JAMES and myself (on May 31st) to form water camps for the inhabitants of Taipingshan was not acted upon. "To keep the people in Taipingshan separate from those in the as yet unaffected districts we recommend very strongly as a suggestion that a water camp be formed, separate from those on the land proposed for the unaffected districts (whilst a thorough scavenging of the other parts of the town was going on). Things look so serious that these measures appear to us to be absolutely necessary to prevent a rapid increase of the disease throughout the city and in Taipingshan *especially* and we beg your most serious consideration of our proposals." In spite of the remarks made by the special correspondent of the British Medical Journal in its issue of 1st September (Dr. JAMES CANTLIE), I am convinced that an epidemic of plague in Hongkong could be tackled and got under rapidly if men in sufficient number could be got to do the work. Isolated people should be medically inspected every day and fresh cases would soon cease to occur if the camps were looked after in a proper manner.

As regards *treatment* of the sick, a certain routine of treatment was carried out in most cases. Towards the end of the epidemic a true "survival of the fittest" of the medicines at our disposal occurred.

A ten-grain dose of calomel throughout the epidemic was the usual purgative to commence with; compound jalap powder grains XL was added sometimes, but as a rule the calomel proved efficient, a seidlitz powder six or eight hours afterwards being occasionally indicated. We began feeding with the most easily assimilable nutrient food that could be got; egg flip and strong beef tea, being the most easily procured and the cheapest, formed the most considerable part of the Chinese diet during the acute stage. Brand's Essence and other patent preparations were also given but did not give so good a return for the money expended; they are expensive without being any improvement upon the egg flip and strong beef tea. Moreover the Brand's Essence is generally disliked by the Chinese. Brandy is not so much disliked. Within ordinary limits any nourishment that a plague patient fancied he had, and we were glad to see him take as much as possible during the first two days of illness before he became delirious, as afterwards the difficulty of getting him to take anything at all was very great. So long as the pulse was good we did not stimulate, but began when dicrotism was evident. Ammonia and cinchona we generally started with (half a drachm each of Sp. Ammon. Co. and Tinct. Cinchon. Co. with an ounce of chloroform water being given as a rule every 4 hours). Digitalis generally required to be added early. Sometimes the infusion was used, sometimes the tincture. Different mixtures were kept in stock and according to the patient's condition either ammonia and cinchona were given alone, or with varying doses of digitalis or with strophanthus added. Strychnia was also given, prescribed alone, as the carbonate of ammonia precipitates the alkaloid if used with the mixture. One would have expected that digitalis would markedly improve the pulse if the dilatation of vessels were solely due to vasomotor nervous conditions, but it did not. From experience I found strophanthus better, as it never caused the pulse to get worse as digitalis sometimes undoubtedly did. Far better than either, however, is strychnia which we began to use liberally towards the end of the epidemic, and I think that in future cases the routine use of strychnia should be begun early. The dose, of course, varied with the case, but from 5-10 m. of the liquor strychniæ by stomach every four hours did not seem at all too large a dose, and I should be inclined to give considerably larger doses than this sometimes. Digitalis in theoretical medicine ought to be the best of the drugs above named, but undoubtedly strychnia impressed me as the better drug for the vascular condition. Although it would be scarcely fair to blame digitalis for making all intermittent pulses worse, when intermittency was already evident, yet it certainly did so sometimes. Liq. Ammon. Fort applied to the nostrils was of great use sometimes in the heart failures which often took place, whilst hypodermic injections of ether at this stage were occasionally a necessity. Whilst the majority of heart failure cases proved rapidly fatal, yet in some cases where treatment was energetic it was wonderful to see how some practically moribund sufferers would rally and sometimes get better. We did not despair even when the pulse could not be felt.

Vomiting was often one of the first symptoms that required treatment and this was usually stopped by an efficient mustard plaster on the epigastrium. Vomiting and diarrhoea rarely went together and the best treatment for the former was to procure satisfactory purgation by calomel. I can only remember one or two cases where vomiting was persistent and obstinate after this treatment. If the above means were not sufficient, ice to suck and some hydrocyanic acid and liq. morphiae in an effervescing mixture, given occasionally, generally sufficed to check it. A mustard plaster was also a most efficient application to the epigastrium.

In mild cases small doses of quinine gr. iii thrice a day were sometimes sufficient, with adequate nourishment. Before speaking further of treatment the following axiom must be enunciated—*never use depressants if you can possibly do without them.* The great tendency to cardiac failure has often been noticed in Bubonic Plague, but I do not suppose its more frequent occurrence due to the introduction of Western medicine has been noted. I must confess that many cases were not benefitted by some of the drugs used—drugs which are so often given with impunity in other serious diseases—and in making this statement I am criticising my own as well as my colleagues' treatment. The reason why we did not find out this almost at the beginning of the outbreak was that we had no time to watch the immediate effect of our treatment as there was so much to do, and in many cases which we had marked to watch carefully the patient had succumbed before the next visit was paid.

It has to be borne in mind that we had great difficulties to contend with as regards exact and proper clinical observation at the outbreak of the visitation, there being so many duties to perform—apart from Hospital work—that our medical staff was quite unequal to the strain thrown upon it.

Reduction of temperature was always attempted by tepid sponging, and even then ice had to be freely used as the temperature of the water we had to use was always over 75° F. and generally over 80° F. Patients with a temperature of 104° F. and over were sponged every hour through the day or as nearly every hour as circumstances would permit. All patients with a high temperature were benefitted by cold applied externally, and this sponging was always the best antipyretic. Antipyrin in large doses was frequently followed by disastrous results, and towards the end of the epidemic grs. v. of phenacetin were given when the pulse was fairly good, phenacetin evidently being less depressing than antipyrin. Not only this but even by the use of large doses of antipyrin or phenacetin temperature was only very occasionally reduced by more than 2° F.; a result not commensurate with the danger run. Brandy and tepid sponging were without doubt the best antipyretics. Aconite and antimony were tried once or twice to commence with; the idea being that by keeping the circulation quiet for 24–48 hours and then stimulating, the patient might have a better chance of pulling through. This treatment was a failure.

The question of procuring sleep was an important one and here morphia was our sheet anchor all through the epidemic. Notwithstanding the fact that in plague we have almost all the contra-indications for the use of morphia yet it was far and away the most serviceable drug. In the early stages of the disease it was often given freely; and in the later stages, used in much smaller doses, it was of equal benefit. Granting its apparent danger, it proved in result much more satisfactory than any other hypnotic used. From one eighth to one half a grain at night was given as a rule with safety at the commencement of sickness, while in later stages gr. $\frac{1}{8}$, repeated if required, was the general dose. Notwithstanding all this I admit that it is necessary to carefully judge what cases to give it in, and when to give it; and to remember that grave issues must be faced in giving it.

Hyoscin in doses of from 1/200 gr.—1/75 gr. was the next best hypnotic we used. In some cases it acted in a marvellous way, in others it was apparently without effect. Chloral and bromide of potash in combination (the usual doses of grs. xx and grs. xxx respectively) was in many instances quite sufficient, but here the cases were as a rule mild. The ice-bag should be in continuous use. Case I.—our hospital "boy"—was conscious at intervals almost to the last, and the only thing he resented was the removal of the ice-bags when they had to be refilled. The ice bags should be large and one should be placed on the forehead and the other at the nape of the neck.

Blistering of the nape of the neck and lower occipital region was sometimes beneficial. We found the best way to do this was to use the emplastrum lyttæ as Dr. HORDER suggested, viz., by repeated but short applications just to prevent vesication. Of Leiter's tubes we had none, and the imitations we got made by Chinese workmen were not a success consequently they were not tried.

Thirst in European patients was more marked than in the Chinese, and the soldiers attacked seemed to thrive on beer and stout which had been well iced. This was what they preferred to have and I must say it did excellently well, being at once stimulant, soporific, nutritious, and thirst quenching. Ice cream made with pure cream was also greatly relished by the European patients.

As regards diarrhœa the best results were got from salol grs. x every 4 hours. Naphthol and other similar drugs would probably have been equally good but were not so easily procurable. In another epidemic some of these so-called intestinal antiseptics should be freely used, as they do no harm as a rule, and the possibility of diminishing the virulency of the faeces by their means should not be overlooked. Mist Astring. c. Opio was of little avail. Enemata of starch and opium were not of much use either, being seldom retained for more than a minute. If straining was troublesome a suppository of morphia gr. $\frac{1}{4}$ and cocaine gr. $\frac{1}{2}$ as a rule brought about comparative comfort after two or three introductions. The treatment of the bubo resolved itself into simple methods. Glycerine and belladonna at the beginning of the epidemic was the most useful applications, on account of the painful character of the swelling; whilst later, when suppuration did not take place so often, iodine proved the more useful application. In the earlier period of the epidemic this drug would have had no more effect than ditch water. Whenever redness appeared we poulticed at once and opened; whenever pus was diagnosed, we opened freely and drained; iodoform being the best application, the bacilli in the swelling disappearing from the discharge in a few days. It was very necessary to ensure good drainage, as if imperfect, burrowing was almost sure to be very troublesome. Bladder trouble,—Retention, Cystitis &c.,—had to be met by catheterization, diluent drinks, strychnia,—in fact ordinary treatment; lung trouble by ordinary medical measures; the addition of a little senega to the ammonia, cinchona and digitalis being as a rule quite sufficient to bring about improvement. Pneumonia was treated *secundum artem* as it arose—and we soon learnt to keep a sharp lookout for it, especially after the first fever.

Camphor was given to Professor AOYAMA, (as it was one of his favourite drugs) as a cardiac stimulant. It could not do harm, but we took good care to let him have plenty of ammonia, brandy, digitalis, &c., as well.

AOYAMA himself, before his attack, had suggested in the wards that digitalis folia would probably be the most satisfactory method of exhibiting this drug—his suggestion was applied in his own case, but without any specially marked good effect.

When it is borne in mind that the loss of hæmoglobin was noted as an important symptom from the very beginning of the outbreak, the possibility of the transfusion of healthy blood naturally suggested itself as likely to be at least a small help in treatment. Some experimenters maintain that it is no use, or rather that salt and water is as good. I doubt it. Not only would the amount of hæmoglobin be increased, but fresh and healthy leucocytes would be introduced into the patient's system, and there is no knowing what assistance this might not be to the fighting line of the person attacked. When Captain VESSEY was so ill we had numerous volunteers from his regiment to give blood if the course of the case proved suitable for the operation, but as in his case the hæmoglobin did not fall below 40% and his lung and brain symptoms were so acute, the occasion did not occur. In one case where a Chinaman had been lying in a collapsed condition for almost two days we transfused him with a hot saline solution with the result that his circulation improved for some hours, but he again sank into his former state of collapse and died. The fluid was injected at a temperature of 110° F. in the funnel, and had a distinctly beneficial effect on his general condition, but it was only temporary as we expected it would be.

A supply of oxygen for inhalation was kept ready for all the European and Japanese patients. When administered it always improved the pulse and respiration for a short time. It was only used in the worst cases—the trouble of preparation and administration, and the want of time preventing an extended experience of it being gained.

Injection of iodide of mercury into the bubo was tried at the Alice Memorial Branch Hospital but I do not think with success. We tried carbolic acid in a few cases but it was useless. I do not think that these injections can ever be of the slightest good after the disease has developed, as the greater part of the solution cannot be absorbed, and the amount necessary to counteract the poison would simply assist in killing the patient.

Nitrite of amyl and nitroglycerine were suggested by some enthusiasts as suitable drugs to be used in heart failure in the later stages. They were never tried as in my opinion they would only have made the vascular condition worse.

MORBID ANATOMY.

On opening the abdomen in only a few cases could the spleen be seen coming below the ribs. It was however always somewhat enlarged and hyperæmic. In consistence it was softer than normal but not diffuent as is sometimes met with in malignant malarial cases. The malpighian bodies were always swollen and well marked. There were occasionally small punctate subcapsular hæmorrhages, these were never large on the surface of the spleen. In one or two *post mortems* considerably enlarged spleens were met with, but in my opinion the enlargements were principally due to malarial causes, and this seemed to be borne out by the greatly thickened and fibrous capsules. This would not be likely to happen in the course of a week's illness. Towards the end of the epidemic very few hæmorrhages were found on the surface of the spleen, or in fact anywhere.

The liver as a rule showed no marked enlargement. It was generally soft and more friable than normal. Occasionally small hæmorrhages were seen on the upper surface—punctate in character. It was generally somewhat paler than usual, but in two cases the substance was deeply bile-stained. The gall bladder was almost always full of dark brown tarry bile—on very few occasions *post mortem* was it found really distended. The kidneys were usually congested, with occasional small subcapsular hæmorrhages; none were seen in the substance of the kidney.

In the mesentery very large hæmorrhages were sometimes met with, and these seemed to be largest in cases where the glandular affection partook of a large hæmorrhagic character. Hæmorrhage on the serous coat of the stomach was not seen. On the mucous surface they were occasionally seen, and here again they were always punctate in character. The small intestine was occasionally inflamed somewhat, and here on several occasions Peyer's patches were distinctly affected, rising slightly above the surrounding surface, and presenting a retiform appearance. On a few occasions some of the solitary glands in the large intestine showed a similar inflammation. The mesenteric glands were *almost always* enlarged; sometimes slightly, generally markedly, and occasionally considerably. When small they were of a dark blue or purple colour, with no hæmorrhage into or around them. As the size of the gland enlarged there seemed to be a greater tendency to a sero-sanguineous effusion around, as in the case of the externally apparent buboes. Hæmorrhage into the ovary (considerable) was met with once, and also a hæmorrhagic endometritis.

The lungs were generally somewhat congested and dark at their bases, and occasionally some fluid was found in the pleuræ; but this was never seen in quantity say of a pint. Pneumonia was present in a few cases. Hæmorrhages were rare on the visceral pleura; on the parietal pleura they were not seen at all. In two or three cases of persons who died late (*i.e.*, after the tenth day) in the disease multiple abscesses were found, pyæmic in character. The bronchial glands were often enlarged although rarely to a great degree. I never saw any of the bronchial glands exhibit the hæmorrhagic type sometimes found in the mesentery. The larynx was sometimes congested and inflamed, but this was co-existent usually with large cervical glandular enlargement, though by no means invariably so.

In some of the early cases we found the *left* side of the heart *firmly contracted*, with the right side dilated. In almost every case examined the right side of the heart was dilated, but in some of these cases we were rather surprised to find the left contracted—it was perhaps to be expected that it might be empty or almost so, but not in the firm condition in which we found it. To my mind this calls for thoughtful consideration, and I regret that a reasonable explanation does not suggest itself to me at present. On a few occasions a small amount (a few ounces) of pericardial fluid was present. The substance of the heart in those who had been ill for several days was generally softer and paler than usual—inflammation going on to fatty degeneration. Under the visceral pericardium on several occasions punctate hæmorrhages were seen—none upon the endocardium. No fresh endocarditis or pericarditis was seen. Antemortem clots were frequently found, especially on the right side; these were generally small however, and did not fill up the cavities, a large quantity of fluid dark watery blood being also present, whilst the venæ cavæ were generally distended by the same fluid.

The thyroid gland was never enlarged except when evidently due to direct extension of the inflammatory mischief in the neck. The thymus in a child was in one case the seat of a large abscess, co-existent with pyæmic abscesses of the lungs.

On opening the skull the meninges were *invariably* found to be hyperæmic, as was frequently the brain matter. In a few cases there was an increase of cerebro-spinal fluid, but this was seldom marked. Both the dural and pial

membranes were generally bright red all over the brain, and occasionally the grey matter underneath was rosy red showing a condition of acute cerebritis. The longitudinal and lateral sinuses were generally full of the dark fluid watery blood. At the base the congestion of membranes, and even the Pons and Medulla themselves, was most marked. Hæmorrhages were rare in the substance of the brain itself, only on three occasions did I see a hæmorrhage in the Pons Varolii, others had been diagnosed during life but not found *post mortem*.

As regards the glands which are affected one met possibly with only one markedly enlarged, or many lymphatic glands in the body enlarged either slightly or to a very great extent. In the early cases, as I have already mentioned, the enlargement in one special region seemed to swamp the interest taken in the rest of the glandular system. The enlarged glands principally affected were generally surrounded by a sero-sanguineous exudation, in the midst of which a hæmorrhagic gland, or glands, was situated. Only in two or three instances was pus actually met with in these on the *post mortem* table. The periglandular effusion was in a few cases very great round a small gland, and sometimes the œdema would extend round this further still; whilst often a chain of glands would be greatly enlarged without any surrounding exudation at all. As the epidemic went on the extravasated fluid became gradually less, and at the end of the epidemic it was seldom seen, the slightly enlarged gland or glands being generally clearly seen as a dark blue body distinctly outlined in the surrounding fatty or subcutaneous tissues (referring to the femoral glands which were generally first cut down on).

Sometimes a *very* great amount of œdema was present in the neighbourhood of the bubo.

MORTALITY.

Taking the total number of deaths and recoveries amongst the Chinese (as far as official figures go) the death-rate was 93.4 %. Amongst Indians it was 77 %; Japanese, 60 %; Eurasians, 100 %; Europeans, 18.2 %.

I have no doubt that one cause of the heavy mortality amongst Chinese was the want of efficient medical attention and nursing in the early days of their illness. Many died in their houses without the slightest attendance. The Chinese admitted to European Hospitals only came in after having been several days sick, when the most favourable opportunity for treatment had passed. The cases which lived longest, or which recovered, were usually under treatment from almost the beginning of their illness. All the Europeans were under treatment at an early date as were several of the Japanese who recovered; and although some of the European cases were not severe I think that early and suitable treatment had a great deal to do with the diminished mortality. I regret to say, that with the Eurasians this was not so. Two of these were under treatment early but both died, whilst another case which was not diagnosed early died on the seventh (?) day. There is no doubt that European blood and stamina had a good deal to do with recovery, and I say this notwithstanding the fact that they were necessarily more carefully nursed and looked after than some of the Chinese. It must always be borne in mind that an intelligent European had every chance in his favour; he was in the first instance very jealous of his earliest departure from health, and lost no time in placing himself in communication with experienced help; then he was able to explain his own symptoms in his own tongue to a medical man who spoke and understood the same language. Again he had confidence in the power of western medicine to help him, and he was untroubled by the constant dread of the "foreign doctor" which environs not only every ignorant coolie, but the vast majority of the more or less cultured classes of the Chinese nation.

CONVALESCENCE AND AFTER EFFECTS.

When a bubo was opened I found that iodoform was the best application for insufflating purposes. After a couple of days' treatment by plugging with lint soaked in carbolic oil and smeared over with iodoform the bacilli usually disappeared from the discharge. This was due, I think, to the antiseptics employed and not to any possible death of the bacilli by the growth of staphylococcus in the pus. In some lymphatic abscesses (in the case of Professor AOYAMA,) which had been present for several days before opening, the bacilli were found in numbers. Hot corrosive sublimate fomentations were the best external applications in most cases, being cleanly and easily applied. Where the bubo was large, dirty, and discharging freely, poultices of linseed, either alone, or with charcoal and dusted over with iodoform, were preferable. Suppuration was sometimes prolonged for a month or more, and where this was so a careful examination sometimes revealed a large

slough which had completely separated, but which still caused a good deal of suppuration (one more reason why one should open the primary bubo freely). The use of iodine, iodide of potash ointment, mercury, &c. locally, all seemed useless even in the later stages of the bubo which had not suppurated. Treat the debility, and the bubo will disappear of its own accord was what our experience taught us. Not only this but the irritation caused by these applications sometimes led to unpleasant results, which it was well to avoid. As a rule an open bubo took from one to three months to close, very few healed under a month. Keloid formation on the site of bubo was frequent in the Mongolian subject. Several cases have come to Hospital lately to be seen.

The vitality of the tissues after plague reached a lower point, I think, than it does after any other debilitating acute disease. In most cases there was not the slightest reaction of the tissues, if cut they remained almost in *statu quo* for days, and granulating wounds were generally called "granulating" by courtesy.

It was only to be expected that head symptoms would occasionally persist for some time. Irritability, perversity of temper, and headache occurred frequently, and even a temporary aberration of mind in some cases.

The condition of the vascular system generally improved rapidly—after the fever disappeared—under iron, strychnia and arsenic, but even here palpitation, breathlessness, and other signs of cardiac weakness persisted for a time. No case of permanent cardiac *valvular* mischief have I yet noticed however in any of the European patients. In convalescence digitalis has not been prescribed. In the few cases where symptoms of œdema of lung, or pneumonia, persisted after the fall of temperature the condition improved by good food, tonics, and the occasional application of iodine externally to the chest.

In some cases the sloughing was extensive, and extended by the lymphatic vessels. In these cases no attempt to heal up took place until the general tone of the system improved.

I have seen some cases lie absolutely comatose for several days in the Chinese Hospital and recover in a most marvellous manner, but these were the exceptions. The mere fact that a man was comatose for so long a time as four days would point to a bad prognosis; yet in the Slaughter House several cases lay in that condition almost uncared for and recovered without a bad symptom afterwards.

Death occurs by—

(a) Sudden heart failure.

In some cases the slightest exertion caused death, even in those who seemed to be convalescent; and it was of the utmost importance that all movement out of bed be disallowed. Some cases had this failure brought on while on the bed pan. Others jumped out of bed in delirium only to be put back, practically pulseless, to die.

(b) Gradual heart failure depending on brain conditions and cardiac weakness.

In these cases the lungs were usually œdematous, and the combination of brain and dyspnœa generally brought about a rapidly fatal result.

(c) Extension of the inflammatory mischief in the neck by causing obstruction.

In these cases nothing could really be done as the state of the patient when it occurred would have made tracheotomy a difficult if not a totally ineffective operation, and would in all human probability have proved fatal. In these cases the amount of œdema and sero-sanguineous exudation all round the anterior part of the neck would have made the operation so tedious that the patient would probably have died before its completion.

(d) Hæmoptysis.

The cause of a couple of deaths.

(e) Hæmorrhage after sloughing buboes.

Two cases of sloughing into the iliac arteries occurred and death took place almost instantaneously.

(f) Hæmorrhage into the Pons Varolii.

This undoubtedly helped to bring about a dissolution in some cases.

(g) Pyæmia and exhaustion.

These were occasionally the cause of death, but infrequently.

(h) Meningitis and cerebritis.

These really come under (b).

THE BACILLUS.

The Bacillus was found in practically every part of the body to which the blood has access. It was especially abundantly found in the enlarged glands and in the spleen. It was found in the other organs of the body and in the blood, but in fewer numbers. In the bubo and in the spleen they were found in much greater numbers in June than they were in September, and I have no doubt that they are always more numerous in cases where a large hæmorrhagic bubo is present. Slight variation in size was met with. The bacillus taken from the blood looks like a diplococcus, when stained with aniline dyes, the intermediate part only staining slightly. The bacillus taken from the bubo stains almost equally all over at first, but after keeping specimens for some time many of them show the appearance of those found in the blood, the staining of the interglobular part of the bacillus evidently not catching hold of that part so well. The bacilli vary slightly in size even in the same case. The capsule of the bacillus is usually distinct under the 1/12th oil immersion lens, and is best seen in some of the bacilli from a bubo where the interpolar part is not too deeply stained. The bacilli grow most abundantly on blood serum or glycerine agar agar at a temperature of from 96-100° F. The blood serum is not liquified. A culture from blood shows small grey semi-translucent colonies over the surface of the serum. Spore formation has not been noticed. When animals that are susceptible are inoculated with a culture they get rapidly affected and die in a few days, the length of time varying generally according to their (the animals') size. Mice, rats, rabbits and guinea pigs are susceptible to the disease. The only pig that I inoculated is still alive, but as I have doubts as to the virulency of the culture a definitive opinion cannot yet be given as to the susceptibility of these animals. Dogs have not yet been proved to be susceptible. The question of the infection of pigs is of the greatest importance, as so much of the meat supply of Hongkong consists of pigs brought from Pakhoi and Canton, where the disease may become endemic. Strict measures may have to be taken in the case of a recrudescence of the disease in Canton. I can only say that so far as it has been noticed dogs seem to have escaped; dead dogs in the streets being conspicuous by their absence. Whenever a fresh culture of bacilli can be obtained this point will be cleared up.

After animals which had been inoculated died, the point of inoculation was found on dissection to present almost the same appearance as the peri-bubonic tissue in man. The spleen was generally enlarged, and in rats there was well marked enlargement of the lymphatic glands. Feeding animals on plague flesh and on buboes generally resulted in their death a few days after.

A one per cent. solution of carbolic killed the bacilli after an hour's application. A two per cent. solution killed practically immediately. Quicklime was almost as efficacious. Four days' exposure of the bacilli to fresh air generally killed them—no positive results being obtained from culture after that exposure—whilst bacilli exposed directly to the sun proved innocuous after four hours. (Temperature of Black bulb being from 150°-160° F.)

I have already mentioned that the bacillus may be found in the blood six weeks after the acute stage of the disease has passed; but this statement must be qualified by the remark that, in the later stages of the disease, it was found that they had generally disappeared in about three weeks.

Patients were not discharged from Kennedytown and *Hygeia* Hospitals until the bacilli had disappeared from the blood; but at the Chinese Hospital they were generally kept about two months, *i.e.*, those who recovered.

QUESTION OF QUARANTINE.

On this much debated subject it is perhaps best to say as little as possible. The question of quarantine, or the medical prevention of the introduction of disease must be decided by each country according to the sanitary state it is in; and upon the history of the disease as I have given it, and upon the facts there recorded the question will have to be settled. The great danger undoubtedly arises in most cases from its introduction by emigrants and their clothing from infected ports. Introduction by merchandise from an infected port though possible is very improbable indeed. If quarantine is to be imposed it is to be remembered that the incubation period has been proved to extend to nine days. I have no hesitation in saying that if immigration was disallowed in non-affected ports quarantine would be unnecessary; but if emigrants from an infected port are allowed to land then quarantine should be enforced, and more particularly so in the case of Chinese. Their baggage in

particular should be most carefully disinfected as the ways of the "heathen Chinese" are just as peculiar in the matter of clothing as they are in some other things. The risk of the introduction of the disease by other immigrants (the ordinary first and second class passengers) is practically *nil*.

ADMINISTRATIVE.

On May 10th when the epidemic was first discovered the Government Medical Staff available for service was composed of the following Europeans:—

Colonial Surgeon, Acting Superintendent Government Civil Hospital,
Messrs. CROW and BROWNE, nine Sisters, Mr. CHAPMAN, Steward,
Wardmaster BRETT, Government Civil Hospital, Wardmasters CUM-
MING and BAYLEY, Lunatic Asylum.

On the discovery of the outbreak on 11th May, the hospital hulk *Hygeia* was moved from behind Stonecutter's Island to West Point, within easy reach of the shore, and every preparation was made for receiving a large number of patients on board. These patients did not arrive on that date as was at first arranged owing to difficulty with the Tung Wah Hospital authorities, but early on Saturday, 12th May, all the plague-affected Chinese in the Tung Wah were removed to the ship, after a prolonged interview between the Colonial Surgeon, Mr. MAY and myself, and the Chinese Committee of that hospital. On this day Police Constables GIDLEY and MCKILLOP were seconded for service in this Department.

On the evening of 13th May, Surgeon PENNY, R.N., having volunteered for service, reported himself for duty whilst Surgeon-Major JAMES of the Army Medical Staff was also sent to assist us and commenced work on the 14th, chiefly under the orders of the Sanitary Board.

On 14th May, owing to the rapidity with which the *Hygeia* had been filled, Kennedytown Police Barracks was placed at our disposal and was immediately opened as a hospital.

On the 11th May, fourteen Chinese "boys," cooks, and coolies were secured to act as nurses on the *Hygeia*, and also three amahs; and on 14th May, eleven more attendants were engaged for Kennedytown; the European staff being distributed between the Government Civil Hospital, Asylums, *Hygeia*, and Kennedytown with orders to remain at their posts until relieved.

On the morning of the 15th May, it was discovered that almost all the attendants at Kennedytown had disappeared—notwithstanding the fact that they were receiving double wages—and in addition several of the *Hygeia* attendants also decamped—having either swam ashore or dropped into the sea to reach adjacent sampans—whilst the other nurses had been looking after the sick. The Chinese Apothecaries, U I KAI and CHAU KAM-TSUN, had been detailed to superintend the dispensary and the administration of medicines, one being stationed at Kennedytown, and the other on the *Hygeia*; whilst the Chinese clerks, LEUNG FU-CHU and LEUNG PING-FAI, had to keep the registers, and procure as much information about cases as possible. The result of this was that on 16th May in addition to the Medical Officers, the following was the staff that was practically doing twenty-four hours' duty on the *Hygeia*:—

Two Sisters.

Police Constable J. MCKILLOP, Wardmaster.

Police Constable T. I. GIDLEY, Wardmaster.

A Po, Chinese Wardmaster.

One Chinese Apothecary.

LEUNG PING-FAI, second clerk.

There were also about fourteen Chinese "boys" and coolies to assist. The boatswain and one caretaker of the *Hygeia* (who were in charge of the ambulance boat) had also disappeared. The above staff had to do the whole of the work of getting patients up the gangway, washed, put to bed, given nourishment and medicine, removed when dead, coffined, and conveyed to Kennedytown by boat for burial. In fact they had to do everything but dig the graves and fill them up.

At Kennedytown the following was the only available staff:—

Two Sisters.

Wardmaster CUMMING.

One Chinese Apothecary.

A CHING, Chinese Wardmaster,

and about a dozen "boys" with an occasional hour's help from some of the *Hygeia* staff, whilst bodies from the hulk were awaiting burial. The Medical Officers generally had to lend a hand at anything that required to be done.

On 19th May, we arranged to retain the services of Dr. W. F. C. Lowson for additional work. It should be mentioned that at this time the work at the Government Civil Hospital was very heavy, the result being that every European was doing on an average sixteen hours' duty per diem, the surgical work at the Government Civil Hospital being much more important than is usual.

On 21st May, the Glassworks Hospital was opened and this relieved our staff to a certain extent. The hygiene of this hospital however caused us a great deal of trouble, and it was only by the occasional employment of extreme measures that this place was prevented from becoming a certain death trap to every one who entered it.

On 15th May six Petty Officers from the *Victor Emanuel* were detailed to assist us with the launches—the Chinese crews having shown a disinclination to work—and as a result of their help the conveyance of the living and the dead was greatly accelerated. It also relieved us of the necessity of sending a Wardmaster with the dead to Kennedytown. The necessity of water transit was also diminished, as the sick for Kennedytown now began to be taken by road—not quite so comfortable a method of conveyance as by boat but one which saved the Medical Department a lot of trouble.

On the 27th May six Alice Memorial Hospital students were engaged by the Permanent Committee to assist; two to look after the sanitation of the Glassworks, and four to assist in town work. The weather at this time was very depressing being very hot and wet, and oilskins and sou'westers were absolutely necessary for any one venturing out of doors.

On the 28th May the ventilation of the Glassworks had to be improved by removing all the glass from the windows.

On the 29th May Wardmaster GIDLEY and all the Chinese on the *Hygeia* were removed to Kennedytown, as I expected that Europeans might soon be attacked by the disease. This apprehension was justified as one Shropshire man was admitted the same afternoon, and two on the following day. After this the *Hygeia* was kept solely for Europeans, Japanese and Eurasians, no more Chinese being taken on board.

On the 31st May it was discovered that the Alice Memorial students had fled from the Glassworks, some of their relatives having unfortunately died, but we soon got help from the Army and Navy Authorities as Privates J. R. MAKIN and H. E. HUSSEY of the Army Medical Staff Corps were seconded (on the 8th June) for services in the Glassworks; whilst Sick-Bay Steward MITCHELL, and Sick-Bay man GEORGE SMITH from the Naval Hospital arrived on the 9th to render further assistance; and improvement in the condition of that place at once took place; the result of obedience to our orders.

On the 7th June I offered to take charge of the whole of the nursing and medical department, an offer made because the Chinese had mismanaged (medically and sanitarily) the Glassworks Hospital; and also because we had been promised assistance, in the way of attendants by Major-General BARKER. We were quite in a position to make this offer as a result of our experience of the previous month, and also from the fact that we were now fairly well provided with medical men. However the Permanent Committee said "no."

The Slaughter House Hospital was opened on 8th June—a building well suited for the occasion, with brick walls, concrete floors, fairly good ventilation, and easily kept clean. In my opinion, however, it was not nearly so good as the old Cattle Depôt which, in addition to good drainage and floors, had magnificent ventilation, long stalls, which would have made splendid wards; equally easily kept clean; and where a small nursing staff could have looked after a large number of patients.

By Saturday, June 16th, all the patients in the Glassworks had been removed to Canton or to the Slaughter House Hospital and the place was shut up.

The Matshed erected opposite the Glassworks was opened on June 17th under the medical supervision of the Alice Memorial Hospital Staff. Owing to the want of proper drainage here, and to the usual tendency of the Chinese, when not looked after, to throw rubbish about, an insanitary pool of rubbish accumulated at the southern end of the shed which had to be carefully watched to prevent a recurrence. The ventilation of the matshed was necessarily good, as large open spaces had been left between the walls and the roofs, and windows and doors were plentiful. This hospital was closed on July 21st the experiment having proved rather expensive.

On June 19th Dr. J. F. MOLYNEUX arrived from Ningpo to assist in the medical work and on June 24th Surgeons MEADEN, R.N., and BEARBLOCK, R.N., also arrived, and—under the orders of the Permanent Committee—proceeded with the inspection

of junks and vessels arriving from Canton and Macao. Their services were really not required as, with the co-operation of Dr. MOLYNEUX, the staff associated with me was now quite sufficient for the work which had to be done. A judicious interchange of work however enabled the latest arrivals to see a good lot of the plague, and allowed some of those who had been working on shore all along to have a few days fresh air on the water. The junk inspection might have been effective two months earlier.

Dr. MOLYNEUX left on 19th July; Surgeons BEARBLOCK and MEADEN about the end of same month.

On 10th August all the patients in the Slaughter House Hospital were removed to Kennedytown Hospital, and the former place was cleaned up and thoroughly disinfected by carbolic acid, all fittings which had been used being burned. The Alice Memorial Matshed on closing was disinfected by carbolic acid freely applied to the floors, whilst most removables in the way of beds, tables, &c. were burned, or freely treated with carbolic acid. A typhoon in September completed the disinfection by blowing the shed out of sight. The disinfection of the Glassworks was done by carbolic acid and quicklime applied to the walls; all wooden floors being removed and burnt, and the refuse added to the flames. The *Hygeia* was closed on August 8th, the two European patients being transferred to the Civil Hospital. Disinfection here was done by carbolic acid and fresh air.

Kennedytown Hospital was closed on September 26th, the remaining patients being removed to the small-pox observation hut in the Civil Hospital grounds. This hospital was also disinfected by carbolic acid, whilst the convalescent matshed adjoining was conveniently removed piecemeal by successive typhoons in September and October. This matshed had been erected early in June, it being essential to transfer patients to another ward after the acute stage of the disease was over. By this arrangement we had always two lots of patients, one lot requiring very little actual nursing, and the other lot all together in the place where the nursing had to be done.

The *Hygeia* proved a most valuable hospital for Europeans, every medical visitor being greatly impressed with its suitability for this purpose providing as it did plenty of fresh air, every breeze in the harbour, no mosquitoes, and the charm of sea life during convalescence. It would probably have gone very hard with some of the European patients and the Japanese doctors had they been treated on shore, every slight breeze in the harbour bringing great relief to the sufferers. When the rush of Chinese patients came, however, the ship was rather taxed for accommodation, as one private ward had to be used as a mortuary, another as an office, and the others to accommodate the extra staff, &c., which was necessary. Her use as a European hospital during last summer alone has more than justified her existence.

Kennedytown Barracks proved a fairly good hospital, but its proximity to the trees on Mount Davis made it a hunting ground for flies and mosquitoes which sometimes added greatly to our patients' sufferings. The arrangements of the rooms also left much to be desired.

The Commissariat of the Chinese Hospitals at the Glassworks and at the Slaughter House Hospital was in charge of the Chinese themselves. In the Glassworks the food was principally used by the attendants, the patients not requiring very much or when receiving it receiving what was unsuitable. As one or two cases began to recover however the arrangements began to improve, and at the Slaughter House Hospital, when affairs were running smoothly, the commissariat was efficient as far as supply was concerned. The supplies and furnishings to the *Hygeia*, Kennedytown Hospital and Alice Memorial Branch were under the charge of Mr. ROBERT CHAPMAN, the Steward at the Government Civil Hospital, with Sergeant SMITH, R.A., specially detailed to assist him in Alice Memorial Branch work from June 20th to July 21st. The amount of work done by Mr. CHAPMAN was almost incredible, and I trust that the Government may be able to satisfactorily reward this officer, who was constantly at work from shortly after five A.M. till ten P.M. It must be remembered that all this time he had his Civil Hospital work to do also; and when one considers that on no single occasion was there any delay in the delivery of or want of supplies one can only come to the conclusion that it was a hard bit of work well done.

Dispensary hours were long at the commencement of the epidemic, but after getting large supplies of "stock" mixtures made we were able to arrange matters so as to allow Mr. Crow and Mr. BROWNE to devote a considerable amount of time to disinfecting work in the town.

The details as to the changes of the nursing staff were left to Miss EASTMOND, our Matron, and we were able to arrange that the sisters, after being on plague duty for a week, were on duty during the following week at the Civil Hospital, where the work though as heavy was not disgusting or depressing.

During the epidemic two wards were kept at the Government Civil Hospital for observation purposes. This was necessary as cases of plague turned up at this hospital during the night; and as coolies to transfer them to Kennedytown at once could not be procured even at very high wages these had to be kept till morning.

If ever this Colony has had reason to congratulate itself it was when we were able to procure well-trained British nurses. I think the greatest compliment that I can pay these ladies is to say that had it not been for their presence there could have been no well-run epidemic hospital during last summer. Amateur nurses at the beginning of an epidemic, or indeed at any stage where there is a rush, are worse than useless, and multiply the worries of a medical officer *ad infinitum*; not only this but all outsiders took care to give our hospitals a wide berth. When the hospitals were crowded it was often a matter of difficulty for the Medical Officers employed to keep their meals on their stomachs. It would have been much harder if they had had to remain in constant attendance all the time as our Sisters had to do. Small-pox is bad, but there is something specially awe inspiring in plague which seems to appal the onlooker. Cholera and small-pox show external evidences which make a spectator aware of the existence of a severe disease, but to witness rows of plague patients dying off in a hospital has, I am sure, a much more depressing effect on by-standers than the two diseases I have mentioned.

The carbolic mouth-wash for the soldiers employed in cleansing work was made up regularly twice a day at the Civil Hospital for some weeks, the following formula being used:—

R. Ae. Carbolic Liquid,	m. 160
Eau de Cologne,	m. 140
Spirit Camphor,	m. 180
Aquam ad,	o. IV

ft gargarisma.

Quinine in 5-grain doses was also served out to every soldier by the Army Authorities.

Among the attendants at the various hospitals there is evidence of at least three deaths. The Italian sister who died of the disease was nursing at the Alice Memorial branch hospital, and got infected by excessive zeal. Her death was very much regretted, as it was the only death in a European hospital; and we had by this time got so far through the epidemic without loss that it seemed probable every attendant would come out safely. The dangers of nursing should have been carefully pointed out to her. An amah at the Slaughter House hospital became infected and died after removal to Lai-Chi-Kok. An attendant at Lai-Chi-Kok hospital, finding himself attacked by plague, promptly came over to Hongkong and walked up to Kennedytown hospital, where he afterwards died. It is to me a source of keen gratification that none of the attendants in the Government Hospitals were attacked.

Rules had to be made regarding visitors in the Chinese Hospitals, as many people wanted to see friends and relations. These rules were simple—(1) Visitors had to be escorted by the Chinese policeman, and might talk to a patient for five minutes but without touching him. (2) Anyone wanting to stay longer and assist a patient was detained, and reckoned as an ordinary hospital attendant until the patient was better, and then had to undergo a few days' isolation and disinfection.

We were able to keep an observation ward in the Slaughter House Hospital.

STATISTICAL.

The following table gives the admissions and deaths of those treated in the Government Hospitals:—

	"Hygeia."			
	Total.	Plague.	Observation.	Deaths.
May,.....	157	143	14	114
June,	11	8	3	1
July,	3	3	...	2
	<hr/> 171	<hr/> 154	<hr/> 17	<hr/> 117

Kennedytown Hospital.

	<i>Total.</i>	<i>Plague.</i>	<i>Observation.</i>	<i>Deaths.</i>
May,	71	67	4	58
June,	121	115	6	90
July,	39	28	11	17
August,	95	51	44	32
September,	8	2	6	2
October,	1	1	...	1
	<hr/> 335	<hr/> 264	<hr/> 71	<hr/> 200

It will be noticed that in August and September the proportion of observation cases was large. It was most essential at this period that all possible foci of disease should be removed; and it must be remembered too that at this stage of the epidemic, apparent glandular swellings were seldom met with. Of the fifty-one cases of plague admitted in August only eight had visible buboes when admitted; whilst only two developed them in hospital.

ALICE MEMORIAL BRANCH HOSPITAL.

	<i>Total.</i>	<i>Plague.</i>	<i>Observation.</i>	<i>Deaths.</i>
June and July,	112	110	2	93

In the *Glass Works and Slaughter House Hospitals* under Chinese treatment the following were the numbers. These are given in a somewhat different manner, but I believe the figures are correct:—

Admitted Living,	1,627
Admitted Dead,	828
Sent to Canton,	194
Sent to Kennedytown and Alice Memorial Branch up to 31st July,	26
Sent to Lai-Chi-Kok,	13
Under Observation,	69
To Kennedytown in August,	11
Plague Cured,	74
Deaths from Plague,	2,068
	<hr/> 2,455
	<hr/> 2,455

In addition to these there were treated in the Government Civil Hospital Isolation Wards 32, of which—

7	Died.
6,	Transferred to <i>Hygeia</i> .
19,	Transferred to Kennedytown.

The following table gives the numbers of different nationalities who were affected and died, with the percentage of deaths. This, of course, is only as far as hospital statistics go—the number of dead bodies found in town and sent straight to the burial ground is not included here:—

	<i>Affected.</i>	<i>Died.</i>	<i>Mortality per cent.</i>
Europeans,	11	2	18·2
Japanese,	10	6	60·
Manilamen,	1	1	100·
Eurasians,	3	3	100·
Indians,	13	10	77·
Portuguese,	18	12	66·
Malays,	3	3	100·
West Indians,	1	1	100·
Chinese,	2,619	2,447	93·4

The Chinese figures are difficult to work out owing to so many removals having taken place. The above are the numbers where definite results as to recovery or death are known.

Of the 1,627 persons admitted to the Slaughter House Hospital alive 1,037 were males and 590 females. Of the 828 bodies brought in dead 472 were males and 356 females. Considering the comparative smallness of the Chinese female population it will be seen that they suffered severely. By last census the proportion of females

to males was only 23:57. This heavier female mortality was only to be expected when it is remembered that women and children were practically confined to the houses in the infected areas every hour of the twenty-four; whilst the men were generally absent during the day, and in many cases slept in the streets at night, a thing which the women as a rule are not accustomed to do.

Out of the 2,619 Chinese cases we had reliable information as to age in 2,050 instances. The following table gives the numbers of those affected in the different decades of life:—

	Males.	Females.
Under 5 years,	18	27
Between 5 and 10 years,	65	73
" 10 " 20 " 	281	190
" 20 " 30 " 	244	84
" 30 " 40 " 	323	75
" 40 " 50 " 	233	74
" 50 " 60 " 	127	86
" 60 " 70 " 	56	49
Over 70 years,	21	24

Here again the mortality is somewhat difficult to give correctly on account of the removal of the patients to Canton and owing to other reasons.

TIME OF OUTBREAK.

The question as to when the epidemic started in Hongkong cannot be satisfactorily settled now.

The statements made in certain medical quarters here that the plague was raging in Hongkong early in April cannot be entertained by any thoughtful person who has taken the trouble to study the question. The evidence, on which these conclusions were based, was obtained from Chinamen, who are notoriously deficient in the art of truthful description; and its value is further discounted by the fact that it was freely stated that the disease had been here either "for years" or "as long as could be remembered." Add to this that these statements were only made after the epidemic had been raging for some time, when every Chinaman was wildly excited, and I think it will be conceded that no credence can be put on such statements.

Personally I believe that the first deaths took place in the early days of May. The mortality statistics cannot be depended on in this Colony as far as the proper registration of the *cause of death* is concerned, but the *number of deaths* given by the Registrar General may be looked upon as not far wide of the mark. These numbers were as follows from the 1st April till 9th May, Chinese only in this list:—

April 1st,	7;	April 14th,	9;	April 27th,	12;
" 2nd,	16;	" 15th,	9;	" 28th,	18;
" 3rd,	10;	" 16th,	9;	" 29th,	12;
" 4th,	9;	" 17th,	13;	" 30th,	14;
" 5th,	10;	" 18th,	13;	May 1st,	8;
" 6th,	8;	" 19th,	14;	" 2nd,	9;
" 7th,	8;	" 20th,	11;	" 3rd,	21;
" 8th,	14;	" 21st,	8;	" 4th,	15;
" 9th,	12;	" 22nd,	11;	" 5th,	17;
" 10th,	8;	" 23rd,	18;	" 6th,	13;
" 11th,	14;	" 24th,	8;	" 7th,	18;
" 12th,	14;	" 25th,	8;	" 8th,	24;
" 13th,	14;	" 26th,	17;	" 9th,	27.

These figures are significant. From the 3rd to the 9th May the average daily number of deaths had risen somewhat but to nothing like the numbers which occurred afterwards. Moreover the number of Chinese burials during the first week of May was not excessive, and did not show any evidence pointing to an earlier period of outbreak. If people had been dying in great numbers their bodies must have either been buried, or remained in the houses; and it was noticeable that scarcely a single body found by the search parties was in an advanced stage of decomposition.

We know that plague corpses decompose rapidly, more especially in the hot weather, so that the evidence given above, although not conclusive, is about as nearly so as it can possibly be.

QUESTION OF INFECTION OF SOIL.

A great amount of interest has centred round the district known as Taipingshan during the past months. The area * which was walled in was undoubtedly one of the most noticeably infected parts of the City of Victoria, though First, Second, and Third Streets in the Saiyingpun district were equally bad. Much general interest has been taken on this head owing to the resumption of the land by the Government, money matters having entered largely into this question in a purely mercantile community like Hongkong, where anything of a temporary commercial character always commands the greatest attention.

Taipingshan (by this I mean the closed area) was shut up:—

1st. Because it was badly infected.

2nd. Because in the opinion of the Medical Officers connected with the plague, the majority—if not all—of the houses were not fit for human habitation at that time.

The first of these reasons needs no further demonstration when it is stated that it was difficult to find a house which had not a case of plague in it, while most of them had more than three cases.

The second cause has been demonstrated in the medical part of this report, and may be briefly summarised thus:—

(a) Filth everywhere, scavenging being conspicuous by its merely nominal presence as far as the front door.

(b) Overcrowding undoubted.

(c) The absence or very meagre provision of light and ventilation in most of the houses.

(d) Basements abutting upon retaining walls and with floor surfaces formed of filth-sodden soil.

(e) "cocklofts," i.e., mezzanine floors, and cubicles which effectually led to overcrowding and prevented the entrance of light and air.

Taipingshan having been shut up, the next thing to be considered was "What is to be done with it?" The Housing Commission, appointed by the Governor to consider ways and means for the housing of the native community during the emergency, took evidence on this matter the opinions of Drs. KITASATO and YERSIN being asked, the possibility of the infection of the soil entering largely into the question.

After receiving evidence the decision arrived at was briefly that Taipingshan should be resumed, and should be destroyed, preferably by fire.

Naturally the desire of all medical men is to see a town which is perfect from a sanitarian's point of view, but it is a totally different matter when questions of economy have also to be considered. The fact remains that only a very small portion of the town has been improved, whilst the rest of it—some parts in equally bad sanitary condition at present—has been left in *statu quo*.

I have no hesitation in saying that where a Chinese population has to be dealt with, it will never be possible to keep even a perfectly laid out city in order, unless the strictest surveillance is kept over the inside of the houses; by this I mean looking after the numbers of inmates, the cleanliness of the houses, and the light and ventilation, drainage, etc.

No evidence was given by the local witnesses regarding the infection of the soil, though some of them expressed their opinions. Dr. KITASATO was asked his opinion on the subject only a few days before he left for Japan. I took him round the streets, and as he had lived with me for a month, I was able to get his opinions and views in a much more satisfactory way than by half-an-hour's writing. Dr. KITASATO's statement as regards infection of the soil was as follows.

"I examined several times the dust of the floors, and the soil of infected houses with regard to their bacteriological contents, and only once I found in the dust of a house the plague bacillus. In soil taken from a considerable depth it has not been found so far, but these experiments require to be carried further." It was impossible for him to give a lengthy and careful report on the subject, his report being specially directed at the extremely insanitary condition of *some* houses. He was astonished at the state of affairs he saw, and although quite ready to help

* About ten acres of the most densely populated part of the City was closed by the Government at the height of the epidemic, all the inhabitants being turned out of their dwellings and housed elsewhere. The streets were walled up and constables were stationed to prevent ingress to the "forbidden city."

by giving his opinions he did not give a full report on the subject. This meant time, and as he had what was to him much more important work on hand it was not to be expected that he should take a great interest in the matter. His views were those of one who wants to see a sanitary Utopia, and his expressions of opinion were mainly directed against the conditions which allowed such a state of affairs as he found to be brought about. Dr. KITASATO's recommendations with regard to the removal of soil was especially directed at some houses with earthen floors where the soil had become polluted with filth to an almost incredible extent.

Dr. YERSIN's report was given after a few more days consideration, but even under these circumstances I think he made a mistake. Dr. KITASATO did not state that there *was* plague infection of the soil. Dr. YERSIN on the contrary maintained that there was. His opinion was expressed as follows:—

“I have had no difficulty in discovering in the soil of several infected houses a little bacillus identical with regard to aspect and the culture of the plague bacillus. The microbe inoculated into animals does not kill the guinea pig or the mouse—it possesses no virulence. This property does not surprise me—for already for a long time I had begun to separate microbes of different virulence in the buboes, and I have authentic cultivations of plague which kill neither the guinea pig nor the mouse, like the bacillus in the soil.”

This paragraph opens up subjects which would provide material for a lengthy controversy—subjects which call for much discussion and require many proofs.

Now it seemed that if the plague bacilli were found underground after a few short weeks of the outbreak it was a very serious thing to tackle; and to me it was a mystery how they could find their way through tiled floors—even though the tiles might be porous. If the soil was infected, then it was necessary that serious measures should be undertaken—if not, then there was still time by proper means to make any future infection of the soil impossible. As so much hinged on this question, I got Dr. KITASATO's assistant, Dr. TAKAKI, who had just arrived from Japan, to make an extended series of experiments with me, which effectually proved that there was no infection of the soil. An organism was found which was almost identical with the plague bacillus, but this, on closer examination, was found to be really different, and this view was afterwards borne out by Dr. KITASATO, to whom numerous specimens of earth from the worst houses were sent, and to whom the results of our local experiments were submitted for criticism.

This same organism, closely resembling the plague bacillus, was found in earth taken from the garden of the Government Civil Hospital. I have not time at present to go into the minute details of the case, suffice it to say that numerous experiments with soil at depths of from one inch to twenty inches were made in the most careful manner, and the results were always the same as regards the absence of the plague bacillus.

The main causes of the *spread* of the plague were as follows:—

- (1) Want of means for the isolation of people who were almost certainly incubating the disease.
- (2) The grossly insanitary condition of the latrines.
- (3) Overcrowding.
- (4) Want of efficient house scavenging and the filthy habits of the inhabitants.

These were the most potent factors in the spread of the epidemic; and these simple but urgent matters should be put right forthwith. While I write this, the houses in First Street and several other streets not far from the Government Civil Hospital are in as bad a condition as—if not worse than—they were in April 1894.

THE TUNG WAH HOSPITAL.

In a report on the Plague to the Government written by myself on the 17th May, 1894, the following paragraph appeared:—

Dangerous Ground.

A Sanitary and Medical view of the Tung Wah Hospital.

“The question of dealing with the Tung Wah Hospital must now be seriously considered. I cannot denounce this hot bed of medical and sanitary vice in sufficiently strong terms. I venture to say that if the question of allowing this to remain was to be submitted to the Public Health Authorities at home they would order its immediate abolition. Here I know that a political element enters into the question, but I doubt if those who have supported it most would do so now if they knew what a Disgrace and Danger to the Public Health of Hongkong it is.”

After an even more intimate knowledge of this place I can now only reiterate what I then said.

Lately a great deal of discussion has taken place concerning a special kind of fever, which is supposed to be a feature of the building in question; and various methods have been suggested for trying to find out its peculiar characteristics. There need be no mystery about it as there is no new disease to be discovered, and in the majority of cases it is ordinary Septicæmia and nothing else, which has led to the mortality returns including so many deaths from "simple continued fever." I do not believe a single medical man could be found to uphold its existence as a hospital, one of the curiosities of Hongkong to medical visitors having always been the Tung Wah Hospital. The native Chinese hospitals I have seen in other places are generally far superior to the one which is now permitted to remain in the middle of a densely populated part of Hongkong. Masters have improved lately to a great extent, but still they are bad enough.

As a remedy I would suggest the following:—If it is absolutely necessary to have a dead (and dying) house in the city then allow the Tung Wah Hospital to be a receiving house for all sick persons. Patients who are moribund may be allowed to die there; but all who can be moved should be sent at once to some hospital outside the city, which should be under European supervision. Such a place as the Old Cattle Depôt, for example, could be made into a model Chinese hospital at comparatively small expense. Overcrowding in the city is being legislated for, but, so far, overcrowding in the Tung Wah Hospital has never been considered. Scavenging in the city has been provided for, but no step in this direction has been taken for the Tung Wah, though it would take a large army of scavengers, with an efficient man in charge, to keep it clean. The visiting medical officers cannot be expected to do this themselves; and one and all of them during the last six months are unanimous in their opinion upon this subject. There is a curious custom in Hongkong of giving Chinese hospitals notice of intended visits of inspection by officials, and it is a perfect study to watch results. A place that is, under ordinary circumstances, a perfect abomination of filth, is, by the use of a large staff of coolies, transformed for the time being into what might be termed "passable" by the ordinary visitor. A slight examination by an observant person, however, usually reveals a lot of the dirt and rubbish hidden away under the beds, or secreted in some box or other receptacle, and presently, after inspection is over, the old order returns. "Tung Wah Septicæmia" will soon become a stock phrase in Hongkong; it has already become so in the medical circles where most is known about it.

It is difficult to speak calmly on this subject, and to the authorities at home it must seem incredible that the state of affairs is such as I have far-from-fully described. If the Government are to recognise a hospital where Chinese quackery is to have full play as regards treatment, then it is all the more essential that responsible men should be appointed to supervise it with *full power* to prevent what is closely allied to *malpraxis*. I have had a good deal to do with the Chinaman when in hospital, and can state that when once he has had a slight experience of Western medicine he is generally, if not always, desirous of remaining under civilized treatment.

During the epidemic several semi-political questions cropped up, one of the most important being that of the removal of patients to Chinese territory. The method of burial with quicklime which was practised here is not approved of by the Chinese, and this was the principal reason upon which they based their desire for the removal of natives suffering from plague from the hospitals in Hongkong.

When removals to Canton from the Glassworks-Hospital were first sanctioned, it was understood that a great number of patients wanted to be removed thence. When asked by us, out of over 220 patients only 7 wished to go. Of the former number I considered about 130 to be in a fit condition to be asked the question, and these answered with a fairly clear judgment. Of the 7 who wished to go only 3 were actually suffering from plague, the remainder being their attendants. On the following morning at 11 o'clock of the 220 whose wishes had been consulted 70 were dead, 112 wanted to go to Canton, whilst the others were too ill to be able to formulate an opinion.

When removals to Lai-Chi-Kok were sanctioned, nearly 350 were asked whether they wanted to go, but not one wished to be removed at the first time of asking, *i.e.*, on admission, and as the result of the enquiry being several times repeated subsequently only 13 altogether were transferred to that place. The experiences of those removed to Canton were too well known by the patients, it being a most significant fact that after the first four junks with patients left for Canton not a single patient could be *persuaded* to leave for that city.

In the Slaughter House Hospital one afternoon, when 65 patients were asked if they would like to go to the British Hospitals, 58 expressed their desire to go—on the following day only 4 of these actually did so.

On the 4th August, when we were arranging with Mr. WEI YUK to remove all the patients in the Slaughter House Hospital to Kennedytown *all* the patients there expressed their *extreme desire* to be removed to Kennedytown Hospital. Those remaining on the 10th August were so removed. The “extreme desire” was due to the fact that the Chinese had had enough of hospital work.

Chinese patients treated in British hospitals refused point blank to be removed anywhere until fit to be discharged, and in most instances it was a difficult matter to get rid of them when discharged. All this goes to prove that the patients were simply bullied by those in charge of the Chinese hospitals, and that all the noise about removals to Canton and Lai-Chi-Kok was made by outsiders.

Without entering into further personal experiences—and not to relate many similar instances, which Surgeon-Major JAMES, Surgeon PENNY, Dr. W. J. C. LOWSON, and Dr. J. F. MOLYNEUX have mentioned to me—I have no hesitation in saying that a great deal, if not all, of the opposition and difficulty, which was experienced during the epidemic, was directly caused by those in authority—Chinese doctors (?) and influential natives—at the Tung Wah Hospital; and by the neglect to promulgate the ordinary dictates of Public Health, attention to which has made many parts of India, and other Colonies, what they are to-day. It was this same Chinese opposition which almost led to riot on several occasions during the latter end of May, and during the early part of June; and which was at the bottom of many personal insults and threats that compelled the medical men occupied in plague work—who had to bear the brunt of Chinese dislike and intrigue—to carry loaded revolvers in their pockets when they reached the excited neighbourhood of the Tung Wah Hospital.

The mortality statistics of the Tung Wah Hospital have also given rise to a good deal of discussion, but here rather a want of knowledge of the circumstances under which the Hospital is conducted has been displayed. An absolutely correct return of deaths will never be got unless *post mortem* examinations are made in many cases, and I don't suppose that these will be allowed. Not only this but in trying to get a definite diagnosis of fever cases it is possible to go too far. Every careful physician knows the difficulty of distinguishing typhoid fever from other fevers, especially malarial, and this difficulty is intensified when the cases can only be seen once or twice at most, or when the case is moribund on admission.

The proposal to place some of the students of the Chinese School of Medicine in the Tung Wah to improve the preparation of the mortality statistics is a bad one, and would not improbably lead to a sense of false security. Where it is difficult for an experienced European doctor to make a correct diagnosis it would be scarcely fair to ask a semi-educated Chinaman to do so; and the result would be that causes of death would be given, but possibly not the right causes; and the new state of affairs would be worse than the old, in fact, an exemplification of the saying that “a little knowledge is a dangerous thing.”

The only remedy is to sweep the place away except as a receiving ward for dead bodies and for persons in a moribund condition, and to have another hospital outside the city and under proper European supervision; where Chinese medicine might be allowed a considerable amount of latitude, but where glaring medical and surgical atrocities would not be allowed.

PROPHYLACTIC VALUE OF OPIUM.

Several statements were made—probably by interested persons—during the epidemic as to an alleged immunity from the disease acquired by opium smokers. There was no such immunity, as many opium smokers died in the various hospitals. The following extract from a letter to the Colonial Surgeon on this subject dated 11th August, 1894, gives my views upon the subject:—

“In answer to your question I have to state that it is not a fact that ‘no opium smoker has died from plague.’ Numerous opium smokers and several opium eaters have died during the epidemic. The proportion of opium smokers admitted will never be ascertained as so many patients arrived at the hospitals delirious or comatose.

“Opium smokers would certainly be less liable to infection than those who do not smoke anything at all but I am of opinion that in the case of plague smoking

good tobacco is of greater benefit than smoking opium. In plague it is the atomised carbon which is of prophylactic value. An opium pipe cannot have the specific effect in prevention of plague that it undoubtedly possesses in malaria.

"After a person has been attacked by plague an opium pipe under judicious medical supervision will undoubtedly act as a sedative in the acute stage; but here again it could not have the wonderful effect as a curative that it often has in malaria, phthisis, and bad neuralgia.

"During convalescence after plague its use is indicated for those who have smoked opium previously and is here of great benefit."

In the case of two opium divans where careful enquiry was made I found that no inmate had been attacked by plague and several customers had made them their residence for some time. Any one who has been into a busy divan in the City of Victoria knows that the amount of smoke generally evolved by the inmates prevents one seeing across the room. Infection by inoculation is of very frequent occurrence, and I cannot see how opium smoking could possibly prevent infection by this channel unless by physical or chemical action outside the body. An opium smoker may finish his smoke and afterwards go into an adjacent house and be infected with the disease—the pipe he smoked some time before is then of no prophylactic use.

Moreover the mere fact that these houses were opium divans was not the only reason why they escaped as each lessee took very good care in his own interests to keep out any visitors who had any appearance of being sick, and if any one had become ill in the house it is pretty certain that he would have been very soon turned out of it.

Opium smokers who recovered were not allowed to smoke in the Government Hospitals but, from the rapid way that several opium smoking inmates of the Slaughter House Hospital convalesced when allowed to smoke, I should be disposed in future to allow them to have their usual pipe in some outside ward or matshed. Several patients were noticed in the native hospitals who smoked through their whole illness, some of their friends attending them to keep the pipe frequently filled, and it must be said that they seemed to give very little trouble, whilst food very rarely crossed their lips.

DRAINAGE STATISTICS.

The following table prepared by Mr. J. R. CROOK, Sanitary Surveyor, shews that in the principal infected areas houses which were drained under the Public Health Ordinance were affected in fewer numbers than those which were not connected with the new drainage scheme.

Taipingshan District.

	<i>May.</i>	<i>June.</i>
Houses redrained under Public Health Ordinance.....	33% affected	30% affected
Houses not so drained	36% affected	36% affected

Western District.

	<i>May.</i>	<i>June.</i>	<i>July.</i>
Houses redrained under Public Health Ordinance.....	10%	17%	2 %
Houses not so drained	13%	26%	3½%

These differences are so small that it would be wise not to attach too much importance to them as a proof of the necessity of having efficient drainage.

PRESENT SANITARY REQUIREMENTS.

The following matters require urgent attention :—

- (1) *Vital Statistics.*—A reliable record of vital statistics prepared *under the immediate supervision of a duly qualified medical practitioner* should be at once instituted. Compulsory notification of death is necessary. There is no law at present to enforce it.

- (2) *House Drainage*.—Existing regulations should be enforced regarding the design and construction of house drains, and remedial measures for removing existing defects should be put into effect.
- (3) *Scavenging*.—Thorough and efficient scavenging of all public and private streets, lanes, alleys, yards and premises throughout the Colony is a great necessity.
- (4) *Light and Ventilation*.—The existing laws with regard to light and ventilation require to be enforced, and regulations as to the height of buildings and the width of streets should be introduced. (A new Act has just been made.)
- (5) *Basements*.—An enactment prohibiting the occupation of basements as domestic dwellings is very necessary.
- (6) *Wells*.—All wells situated within the thickly populated areas of the City and used for dietetic purposes should be closed at once.
- (7) *Latrines* should be provided on suitable sites throughout the City and maintained by the authorities in a cleanly condition.
- (8) *Insanitary Dwellings*.—The laws relating to insanitary dwellings and the closing of those unfit for human habitation should be enforced.
- (9) *Private Lanes and Streets*.—All private lanes and streets should be resumed by the Government and maintained in a proper condition.
- (10) Back-to-back houses should be demolished as soon as possible.
- (11) *Dairies*.—All dairies should be removed from the crowded districts of the city. This has been pointed out in previous years by the Colonial Veterinary Surgeon.
- (12) *Bakehouses*.—Existing laws and regulations affecting bakehouses require enforcement.
- (13) Importation of dead meat from the mainland should be strictly prohibited.
- (14) *Importation of Animals*.—Reception lairs should be provided to allow proper inspection of all animals imported into the Colony.
- (15) *Markets*.—Several public markets require sanitary improvement and a market for the wholesale trade in fruit and vegetables should be instituted and efficient inspection should be carried out. The latter is extremely necessary during the summer season.
- (16) Sheep and pigs should not be kept in houses which are inhabited by or are built for the inhabitation of human beings.

It is a matter for regret that the Resumption of Taipingshan should have been carried out before these most necessary sanitary improvements have been effected which are, I believe, far more necessary than the former. They are the common-places of Public Health, but they require a judicious expenditure of money to carry them out and efficient men to supervise them.

CONCLUSION.

In conclusion I wish on my own behalf to heartily thank those especially associated with me in the medical work, Surgeon-Major JAMES, A.M.S., Surgeon PENNY, R.N., Dr. W. F. C. LOWSON and Dr. J. F. MOLYNEUX, for the very great assistance they rendered at a critical time. Each had a certain amount of routine work to get through, but where so many developments occurred at all hours of the day and night a serene temper and a ready obedience to orders were necessary to enable us to get through the work during the early days of the epidemic. These were always forthcoming and it was only our perfect unanimity which enabled us to do so much. Surgeon-Major JAMES' duties at the Tung Wah Hospital were as revolting as they well could be—even the dirty work which the officers and men of the Shropshire Regiment had to do was less disgusting.

It is as well to point out that Drs. W. F. C. LOWSON and MOLYNEUX were the only volunteers to help us when matters were really serious. We had other volunteers when the heavy part of the fight was over.

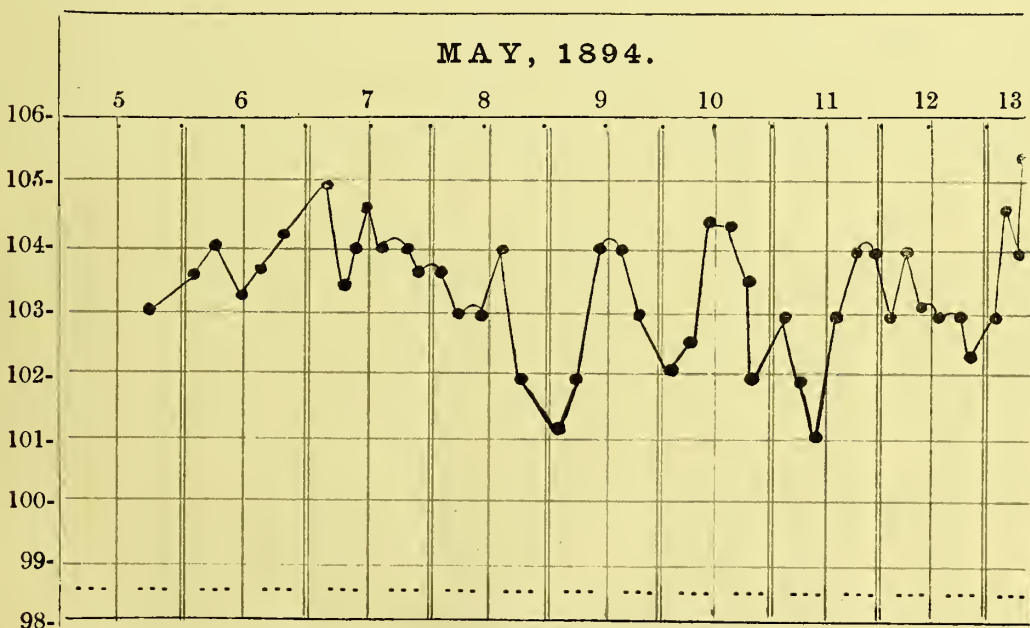
The subordinates of the Medical Department I also cordially thank for their splendid conduct, under circumstances trying to the best tempers, and for the implicit confidence they placed in all orders and directions given for their welfare.

CLINICAL CASES.

The notes of these cases are necessarily rough. Time to re-write them is unfortunately not at my disposal, but it is to be hoped that they will afford a certain amount of interest to medical men even as they are. The remarks made on some of them are not lengthy for the simple reason that we have still a good deal to learn on the subject of plague, and many doubtful points suggest themselves, which it is to be hoped may yet be cleared up. It will be found that some of the treatment does not correspond with what has been advocated in foregoing pages, but it should be remembered that, in dealing with such a fatal disease, it was some time before the best treatment could be definitely laid down; whilst it is probable that even now we have not yet arrived at the best method of dealing with it.

Case I.—Chinese. Æt. 25.

This boy was our hospital attendant. He left hospital at 9 p.m. on Sunday, April 29th, and came back at 9 a.m., May 1st. This thirty-six hours was the only time that he was out of the hospital and did not leave again before he went on the sick list. He complained of feeling unwell on the afternoon of the 5th May, and when his temperature was taken at 6 p.m. it was found to be 103° F. I did not see him until about 1 a.m. on the 8th; he informed me that the swelling of the left femoral gland, which was apparent, first commenced on the evening of the 6th May, but he had not mentioned that to the Medical Officer on duty. The gland was, at this time, the size of a large walnut; there were no lymphatic vessels affected, at least, none were to be seen inflamed; there was no sore on the foot but a small scratch was visible two inches below the knee on the inner side and there were no signs of inflammation or suppuration around it; there were no other glands to be felt enlarged. Great headache. Treatment up to the 8th was quinine grs. x. every three hours and phenacetin grs. x. occasionally, but during the latter day had aconite m. v. and antimony wine m. viii. every four hours only.



On the 9th: pulse still fairly good, but although the temperature is better he is in a more stupid condition and very anxious about himself at times; the mouth and throat are very dry; ice-bag applied to nape of neck and top of head. Chlorate of potash gargle ordered for the throat in addition to aconite mixture. 10th: very torpid this morning, pulse worse and easily compressible complains greatly of hotness in the throat, passing urine in bed, 3 p.m. had a convulsion. Examination of blood shewed rapid crenation of corpuscles—some of them broken down and particles of pigment in some of the white ones (I believe that some of those when seen stained were bacilli, but I did not recognise them as such). At 7.15 that evening the convulsions became very frequent and he had hyd. of chloral gr. xxx. and brom. of potash gr. XL in two doses. The percentage of hæmoglobin in the blood 50.

At 2 a.m. on the 11th: as the convulsions were still severe, he had brom. grs. XL. and chloral grs. xxx. again. In the morning his mind was clearer and he complained much of his mouth being dry, with sordes on the teeth, &c. Hæmoglobin 35 per cent. There have been no more convulsions since the bromide and chloral in the early morning. All day the conjunctivæ have been suffused—

he can retain his urine to-day. The blood is very fluid and watery. 12th: much clearer in the mind this morning. No convulsions. Muttering delirium and picking at the bed clothes occasional. Heart's action is very tumultuous. There are no lung symptoms. The superficial veins in the axillæ and chest are notably prominent. There are no more glands to be felt, however, than the enlarged one in the femoral region. The urine is very scanty and contains trace of albumen and bile salts. Rabbit and guinea-pig injected with blood. Rabbit lived three days, the guinea-pig two. Treatment after the 11th: "ammonia and ether frequently, with brandy, eggs and milk with grs. xxx. bromide of potash on the afternoon of the 11th."

Hæmoglobin on the 12th 18 per cent.

Died comatose on the 13th, 10 a.m.

Post mortem examination same afternoon. Small rose-red spot round scratch below the knee. Small discoloration, scarcely amounting to a petechia just close by bubo.

No enlargement of glands apparent in any other region of the body.

On incision into the petechia below the knee, there is found a hypodermic effusion of thin watery blood. There is no attempt at clotting of blood. On dissection of the bubo the same effusion is found round it. Slight congestion of the lungs. Spleen is somewhat enlarged. The liver friable and pale. The gall-bladder is empty. Some enlarged mesenteric glands. The kidneys somewhat paler than usual. No hæmorrhages in the peritoneum or thorax. The meninges were intensely congested, and no hæmorrhage was found in the brain. Heart (left side) firmly contracted, right side full of dark fluid blood.

REMARKS. This *post mortem* did not assist much as I had only a few minutes in which to examine the body after it had been opened. This case, however, showed us the value of the ice-bag in relieving the headache as so long as the boy was conscious or even semi-delirious he told us that the ice-bag was the only thing he wanted. He took his nourishment well and being most anxious to get well, contrary to the majority of his fellow countrymen affected, did everything and took everything he was told. The boy was anæmic always and the low percentage of hæmoglobin on the 12th, which was several times and most carefully estimated, was not so remarkable as if it had occurred in a full-blooded person. This suggested, at the time, transfusion of blood, supply of oxygen for inhalation, and early administration of iron and chlorate of potash. It will be noticed that some of the treatment was different from what I have recommended.

Case II.—Japanese. *Æt.* 36.

On the 28th June, at a dinner given by the Japanese Doctors to several of the Hongkong Medical gentlemen connected with the plague, Professor AOYAMA's temperature was 101.6° F. He slept well during that night. On the morning of the 29th Dr. CANTLIE saw him and found him suffering from what he supposed to be the results of a dissection wound. At 5.30 p.m. he was seen by Dr. MOLYNEUX and myself, and, the case being immediately diagnosed as plague, he was removed to the *Hygeia*. From the evidence which we procured it seems that on the 22nd or 23rd of June, whilst making a *post mortem* examination, he scratched the left third finger on the posterior and ulnar aspect of the first phalangeal joint. On the 27th of June, he again scratched himself on the end of the right thumb.

When removed to the *Hygeia* he had a temperature of 105° F.; had a bubo in the left axilla without lymphangitis; had a well marked lymphangitis of the right arm extending up to the level of the middle of the humerus; was delirious, very sleepy, and the conjunctivæ were intensely suffused; pulse apparently full and bounding but easily compressible. The bubo was very painful. The heart dulness was increased to the left and the apex beat was about one inch to the left of the nipple line. This was a most extraordinary state of affairs considering that within thirty-six hours the apex beat returned to its usual position and the heart dulness returned to exactly the nipple line; whilst Dr. KITASATO assured us that, as far as he knew, AOYAMA had no previous heart mischief to his knowledge.

Treatment ordered: sponging every half hour; milk, eggs, Brand's essence, with a small amount of brandy *ad lib*; calomel grs. x. at once; a mixture composed of

Ammon. Carb	grs. iv.
Tr. Cinchon	m. xx.
Infus. Digitalis.....	5 ii.
Aq. Chorof. ad.....	5 i.

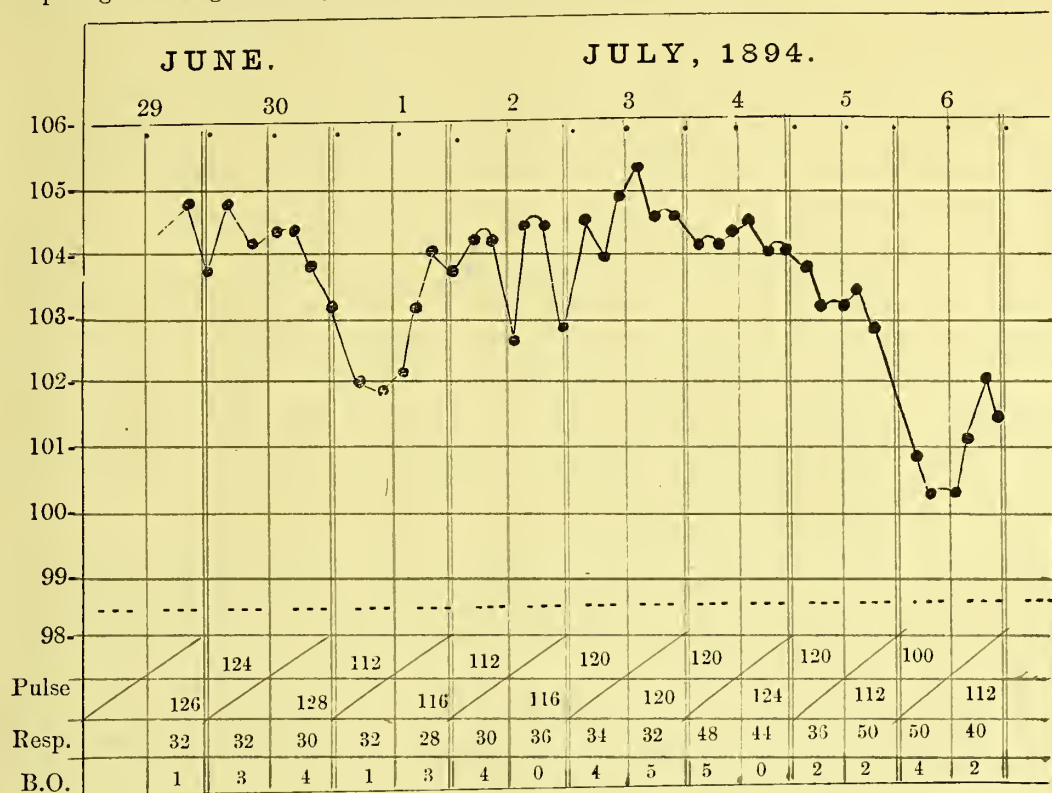
every two hours.

At 2.30 a.m. on the 30th the pulse was much weaker, temp. 105°. Mixture with m. xxx. Sp. ammoniæ added, ordered every hour, in addition to champagne.

At 4.30 a.m. there was no improvement, pulse still very bad. In one of his calm moments he had urged that an ice-bag should be placed over his heart; and, although delirious, had argued so rationally that we permitted him to keep it on during the night. As we thought that this might be one of the causes of the exceedingly bad pulse it was removed; and at 9 a.m. the pulse had considerably improved. At this time on examination he had no splenic tenderness; the condition of anxious dyspnoea was well marked, but did not seem so intense as it was in the early morning. The mixture ammonia, etc., was continued every hour, lead and opium lotion being applied to the right arm and belladonna and glycerine to the bubo, nourishment being continued as before.

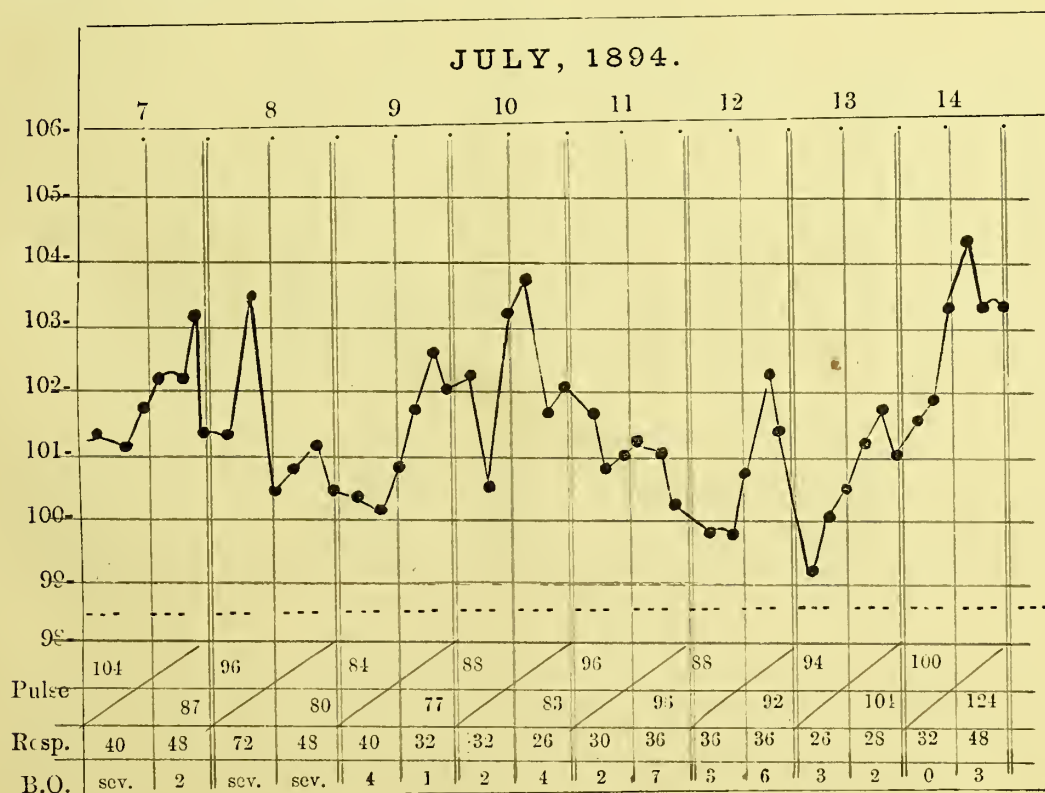
At 3.30 p.m. he had been sleeping somewhat heavily, and in a coherent moment when he awoke announced himself better. The conjunctivæ were less congested, the headache, which up to this time had been well marked, now disappeared, and he seemed generally easier. The digitalis is now

omitted from the mixture which is still given every hour and in addition a pill of monobromide of camphor gr. i. was given every two hours as he had expressed a wish to have that.



On the 1st July, at 3.30 a.m., pulse occasionally intermittent, doses continually, appears better (for temp. see chart). At 9.30 a.m. the right thumb and the left third finger being very painful and considerably inflamed were opened freely and iodoform applied with a linseed meal poultice. Ammon. and einchon. mixture every two hours, along with the monobromide of camphor and nourishment. At 11.30 p.m. has not slept at all; very delirious, pulse again bad; complains of pain in the incised thumb; has vomited slightly; only sp. ammoniae eo. m. xxx. every hour now given in addition to champagne and brandy frequently, and during the night to have two doses of 5 ii. of infusion digitalis.

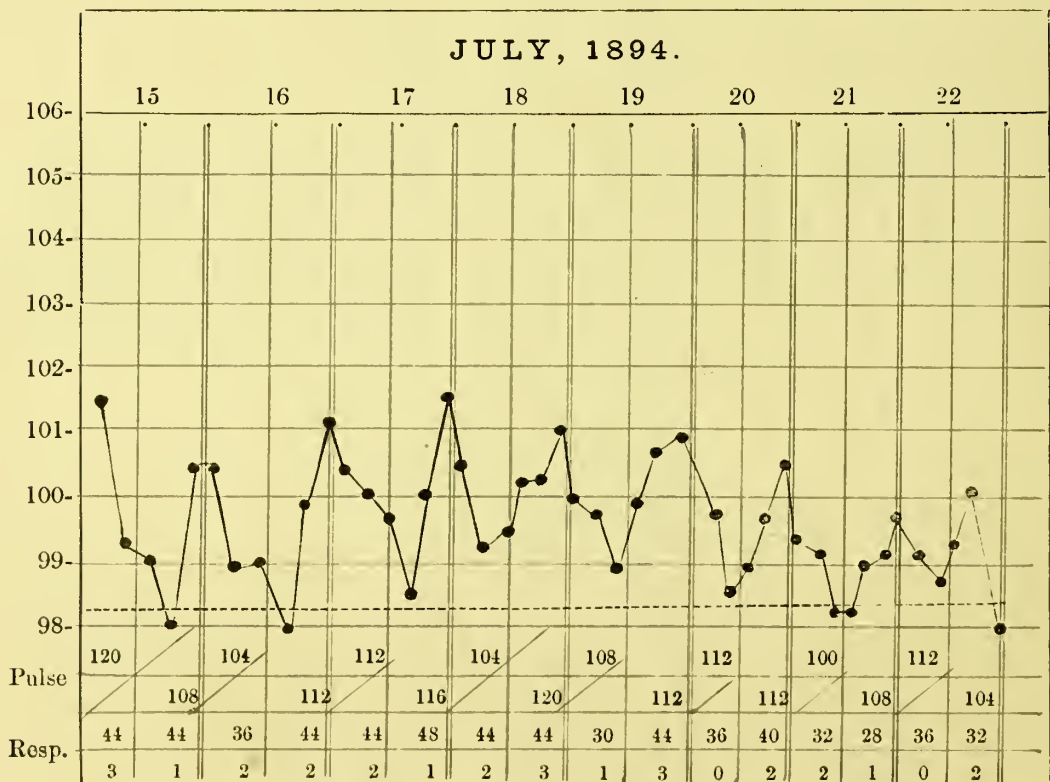
On the morning of 2nd July, the condition was practically the same, but on examination of the lungs there was found to be some hypostasis at both bases, especially on the right side. From this date until the 5th the condition was practically the same; acute delirium, intermittent pulse; frequent stimulation by ammonia, camphor, brandy, champagne, with an occasional dose of digitalis being the order of the day; of sleep, during this time, he had practically none. Sponging on an average every three hours; the water now being used at a temperature of 65° F. Diarrhoea was considerable on the 3rd: treated by enemata of starch and opium, and sub-nitrate of bismuth grs. x. one dose only. On the 4th and 5th it was extremely difficult to keep him in bed, and it was only by tricking or frequent drinking to the health of the Emperor of Japan or Queen Victoria, that we could get him to take any nourishment or medicine.



On the 5th, at 11 p.m., he had 1/100° of grain of hyosein hypodermically and slept eight hours after. On the morning of the 6th, well marked pneumonia at the right base had developed and by this time the catheter had always to be used. Diarrhoea was also distressing and for this grs. x. bismuth sub-nitrate was given practically every four hours. At 10.30 p.m. on the 6th the pulse became suddenly very intermittent and almost imperceptible. Hypodermic injections of ether were given frequently during the following hour and ammonia to the nostrils; the ammonia mixture being continued every two hours. The pulse improved during the night, but the intermittency still remained well marked. At 9 a.m. on the 7th he had a belladonna plaster over the heart and m. vii. of tincture of strophanthus added to the ammonia mixture every two hours, whilst the monobromide of camphor was discontinued.

On July 8th another attack of heart failure occurred, the pulse being imperceptible for some time at the wrist. Hypodermic injection of ether over the heart with hot sponges applied in the same region were followed by an improvement in the pulse within an hour. Diarrhoea afterwards became worse with extreme tenesmus and he was put on salol grs. v. every four hours, stimulation by ammonia still proceeding. In addition, as there was considerable pain in the abdomen and tympanitis, lead and opium lotion was applied in fomentation. On the 11th the condition of the right lung had improved to some extent. The bubo in the right axilla was opened and found to contain pus. It had been very painful during the previous twenty-four hours. Pulse still intermittent, diarrhoea with tenesmus still present. Liq. strich. m. v. ordered three times a day. On the 12th the diarrhoea had diminished, no tenesmus, but still very offensive and the pulse was now only rarely intermittent; salol grs. x. was continued three times a day.

On the 14th the temperature shot up to 104° F. again, and, on examining the right lung, a fresh well marked plenrisy was discovered all round the right base. A blister was applied, and on the suggestion of Dr. CANTLIE, chloride of ammonium grs. vi. were given every four hours with the ammonia mixture. On the 17th he was improving in general condition, ammonia mixture being continued along with the chloride of ammonium, and as the pulse was now fairly good and regular the strychnia was left off. On the 20th quinine grs. v. thrice a day was ordered; extract of malt thrice a day with ammonia mixture every four hours; Burgundy and the most nourishing food being freely administered. On the 21st a very large slough was removed from the axilla. On the 15th the opening of numerous lymphatic abscesses was commenced upon both arms and proceeded at about the rate of six a day for the following week, over 40 in all being opened. On the 24th sulphide of calcium pills gr. ¼ every four hours together with 5 ii. of cod liver oil thrice a day was all the medicine he was getting. By the 26th he was put on a sumptuous diet and small doses of quinine, the cod liver oil being continued.



On the evening of the 2nd of August, after getting a little too excited over the prospect of getting home, he was suddenly seized with breathlessness and palpitation and when I saw him a few minutes afterwards I found him with a fast running feeble pulse about 120 and this continued for about an hour; ammonia being the principal stimulant used in treatment. On the following morning he was prescribed a mixture of iron, arsenic, and strychnine. Cod liver oil stopped and extract of malt substituted. He improved until he was discharged on the 21st of August, when he was advised to take the following mixture:—Liq. arsenical m. v., liq. ferri dialysat m. x., liq. strychnin m. v., aq. ad 5 i. t.i.d.

On the 2nd July there was a trace of albumen in the urine. On the 6th of July there was no albumen in the urine. On the 9th of July there was no albumen in the urine. And on the 31st of July there was no albumen in the urine. He woke up on the 19th of July and was quite rational for the first time, after having been *non compos mentis* for almost three weeks. If I remember right he said that his usual weight was about 160 lbs. On July 29th he was 134½ lbs. On August

6th he was 131½ lbs. And on August 20th 136 lbs. Bacilli were found in the blood by KITASATO on the morning of the 30th of June. On the 11th of July when the bubo was opened numerous bacilli were found in the discharge. On the 15th of July no bacilli were found in the discharge. On the 16th bacilli were found in each of the lymphatic abscesses opened. On the 3rd of August no bacilli were found in the blood.

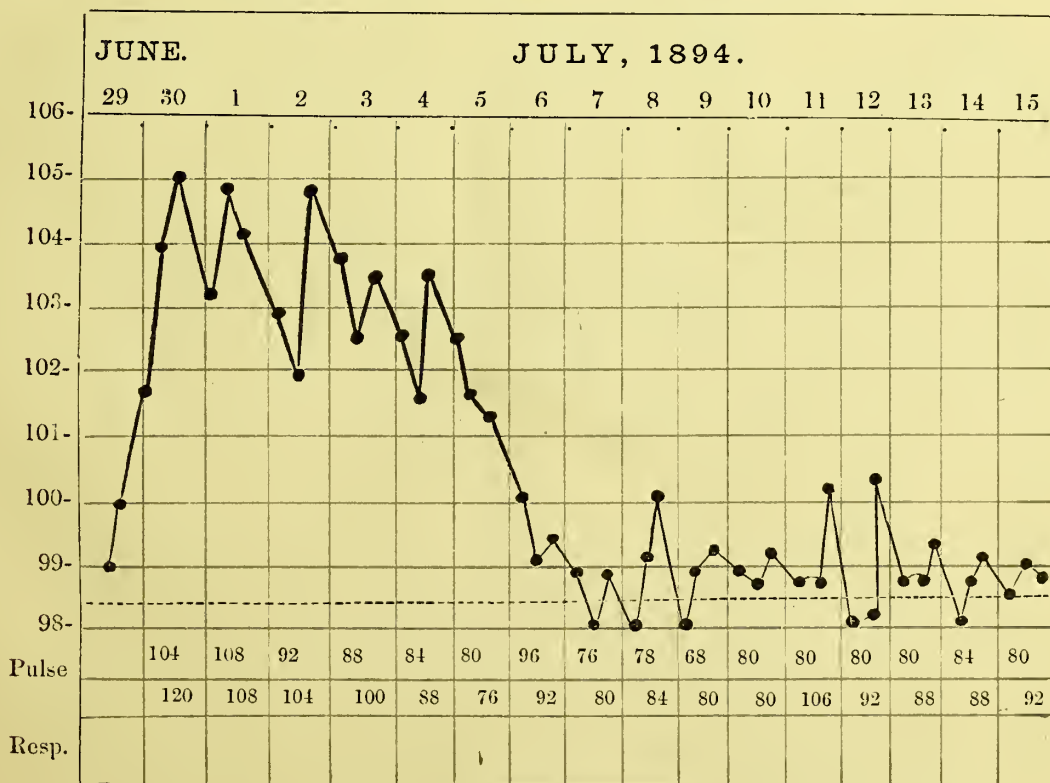
Remarks.—This was a most difficult case to treat. Here was a well built strong man who had been a delightful social companion but when delirious was—well, difficult to manage. Fortunately we had one sister who spoke German and another Japanese and this was a great help as, presumably infected with the war fever, he would not allow a Chinaman to come near him during his delirium. It may appear that too much physic was administered but it has to be remembered that he was in a most desperate condition and ammonia had to be given as practically part of his nourishment and not only that but his mental condition was often such that he could not or would not take part or all of his medicine, so that the above treatment was simply suited to the circumstances of the case at each visit and simply meant stimulate and nourish as much as possible. In his delirium he would often argue in the most rational manner, especially on medical subjects. From the 6th to the 11th July he was too ill to do this as during the most of this period he was in an apathetic semicomatose condition with occasional outbursts of violent conduct. He became conscious on the 19th July and after that slowly improved until able to leave for Japan. The prominent points in his case were the extremely bad pulse, the long period of pyrexia, the complications—pneumonia, retention of urine for a long time, the numerous lymphatic abscesses, the profuse and very foetid diarrhoea and the long period during which he was unconscious and of which he remembers nothing. The bacilli disappeared in a few days from the abscesses after use of iodoform. I saw him in September. At many of the incisions there was a tendency to formation of keloid and although I could find no physical evidence of cardiac weakness he informed me that he was very easily perturbed and tired and that he had headache often whenever he tried to do any serious work. He now relates with glee how he disappointed us—as his coffin had been taken on board on the 3rd July and every preparation made for his funeral on the morrow.

The physical signs of the condition of the heart on the 29th of June require some explanation, which I am unable to give. One can scarcely imagine it possible that the mere application of an ice-bag would cause a change in the position of the heart, which there undoubtedly was. It is a significant fact that after the ice-bag was removed the apex beat and the area of cardiac dullness soon returned to their usual positions.

Case III.—Japanese. *Æt.* 38.

Dr. I. was assisting KITASATO in bacteriological work. Whilst preparing to remove AOYAMA to the *Hygeia* our attention was directed to this patient who had that day felt “out of sorts,” and on taking his temperature found it was 102° F.—pulse rapid, considerable headache, no shiver, slight pain in the left axilla. In addition he had the indefinable appearance of a plague patient, the recognition of which comes intuitively to one who has seen a lot of the disease. He was at once removed with his colleague to the *Hygeia*. On arrival there his temperature was 99° F. At midnight it was 102° F. On the 30th at noon it was 104° F. and at 6 p.m. it had reached its primary maximum 105° F.

Examination showed the absence of any open wound on the left hand; but there was the mark of a small scar on one of the fingers, where he said he had scratched himself some days before. On the morning of the 30th the bubo was very painful, the conjunctivæ very suffused and his condition generally worse. Treatment: ammonia and cinchona, sponging, monobromide of camphor grs. ii. every four hours, with the usual nourishment, egg flip, Brand's essence, beef tea, etc.



On the 1st of July he was rather delirious and breathing, at times, spasmodic, pulse good and regular, but with slight inclination to throw the ice-bag about. The first cardiac sound is prolonged and booming and occasionally a distinct bruit is noticeable. At 6 p.m. he complained of a sore throat and on examination the pharynx was found intensely congested with an ulcer on the palate and left tonsil. Delirium had not been so marked during the day. On this day in the afternoon he had some digitalis added to the ammonia mixture as the pulse began to get weaker and somewhat dicrotic. Chlorate of potash gargle for the throat. On the 2nd of July calomel grs. x. given at night. Urine contains trace of albumen.

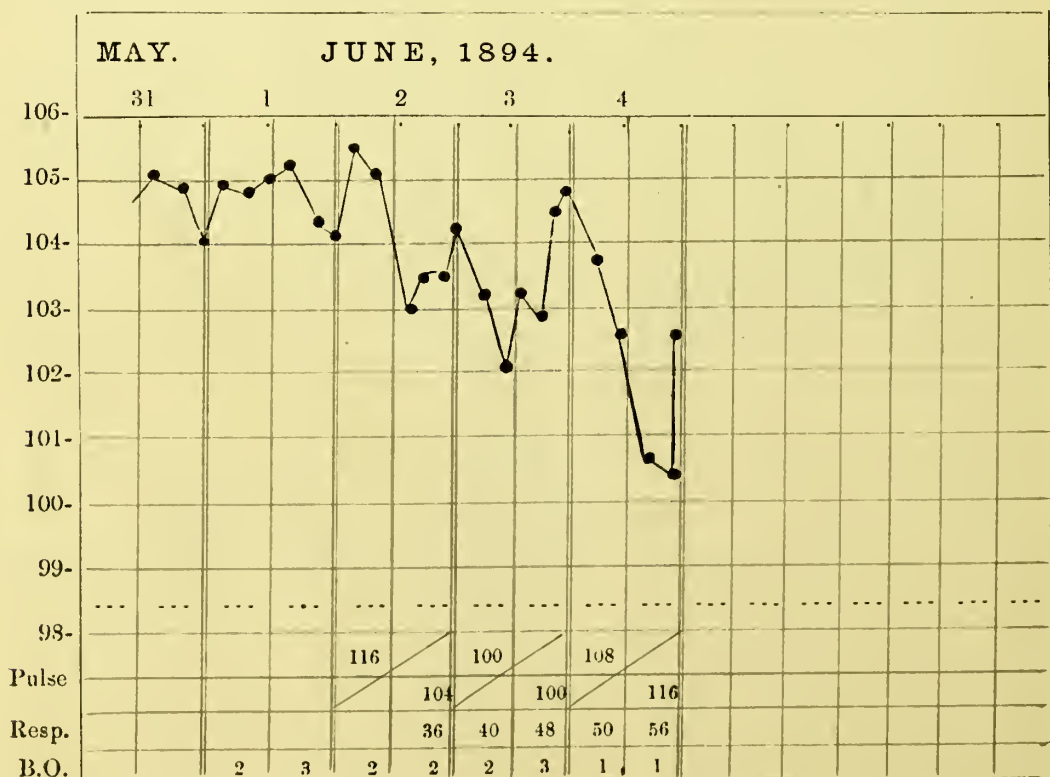
3rd of July: seems better this morning—pulse improved, throat also improved. Digitalis left out of mixture during the day. Monobromide of camphor grs. ii. every four hours, still going on. 4th of July: condition unaltered, digitalis again given with the ammonia mixture—dozing slightly through the day, but very delirious at night. July the 6th: retention of urine. Began to sleep now first time for three days. July the 7th some cystitis evident,—some muco-pus in the eye of the catheter and a tinge of blood. Large quantities of barley water ordered. 8th of July: delirium practically gone and condition improved—strychnin and iron mixture ordered, liq. strychninae m. v. and liq. ferri dialysat. m. viii. thrice a day.

On the 13th of July slight pleuritic rub right side, mustard plaster locally. On the 26th of July some lymphangitis of the left arm, treated by lead and opium. Discharged cured on August the 3rd. Bacilli found in blood morning of the 30th June. Bubo was opened on the 8th and was almost closed when he left for Japan. The pleuritic rub disappeared in a few days.

Remarks.—This patient was easy to manage as he was not physically so strong as some of the patients who were on the *Hygeia* at the same time. The study of delirium in its early stages was a most interesting one at this period. In one ward we had Case V. whose great desire was to have a “quiet wrestle” with his attendant whom he nearly threw out of the window at an early stage of the disease and which he was inclined to try again had not effectual means been taken to prevent him getting out of bed. In the next room was a patient who fancied himself a “fowl in the air” and who usually was in a most happy mood. Next to this patient we had one who, until prostrated, was a most violent subject to deal with, whilst I’s failing was a desire to stand up in bed and address an imaginary audience, but—quite different from II.—always ready to listen to our reasoning and at once obey orders. It will be noticed that this patient’s temperature fell from 103° F. to normal in twenty-four hours, a fall closely resembling a crisis. The throat affection was the only marked one we had where the prominent glandular swelling was not in the cervical region and led me to consider if he had been infected by respiration and not by inoculation. Here also, notwithstanding scrupulous attention to the cleanliness of the catheter, cystitis developed in about thirty-six hours after the catheter was first used but which got rapidly well by simply giving diluent drinks and strychnin and iron. The occurrence of lymphangitis during convalescence was noticed in several other patients, but is only to be expected if the slightest irritation is present.

Case IV.—English. *Æt.* 35.

Admitted May 31st with high temperature, considerable headache, vomiting and a left inguinal bubo. Treatment: tr. aconite m. v., vin. antimonial m. viii., aq. chlorof. ad. 5 i. 4 times a day with draught chloral hydrat. grs. xx. and pot. bromid. grs. xli. at 9 p.m.; nourishment—as much as he could take. Same treatment on the 1st, but as the aconite mixture had not brought down his temperature at 6 p.m. he had antipyrin grs. x. every four hours, four doses in all, aconite being stopped.



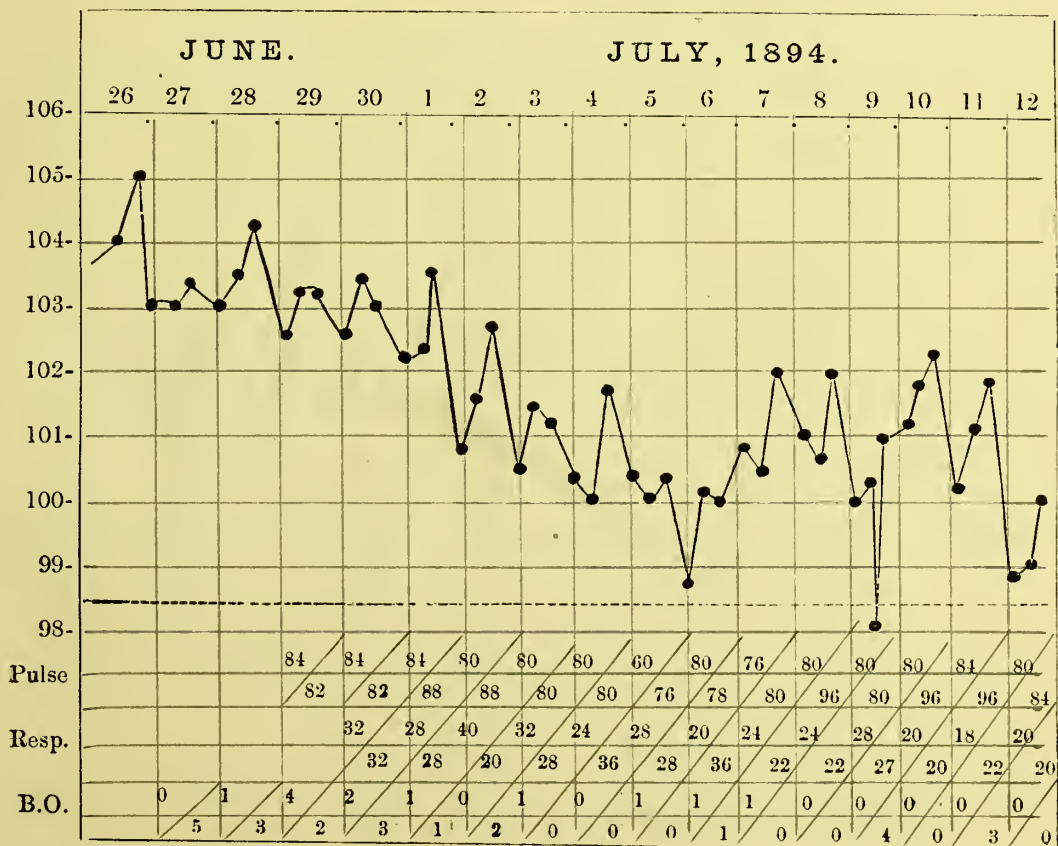
On June the 2nd he continued to take as much nourishment as possible. At 2.30 a.m. as his temperature had not come down with the antipyrin a cold sheet was frequently applied; but with no effect on the temperature until about 8 a.m. when it dropped about two degrees, and as he then shivered slightly it was removed. In the afternoon the amount of hæmoglobin was estimated at 60 per cent, cyanosis considerable. In the evening vomiting was severe and a mustard plaster was applied to the epigastrium. Ice champagne ordered in addition to the brandy in egg flip.

June 3rd: no more vomiting during the night, had only a few snatches of sleep. Quinine grs. v. three times a day, in addition to digitalis and strychnin mixture—tr. digitalis m. vi., liq. strychninæ m. iii. every hour for three doses. At 6 p.m. hæmoglobin was estimated at 53 per cent. There is now slight dulness and fine crepitations at the left base and at night the digitalis and strychnin mixture was repeated every four hours with ammonia mixture. On the 4th—has had a very bad night, great delirium. There are now a few fine crepitations at the right base (hypostatic). The pulse occasionally intermits and the hæmoglobin is estimated at 40 per cent. As his condition was getting rapidly worse I asked Dr. HORDER who had seen a considerable amount of plague at Pakhoi to see him with us but in spite of frequent stimulation by champagne, æther, and ammonia he rapidly sank and died at 9.45 p.m. During the afternoon he had frequent inhalation of oxygen which improved his pulse and respiration temporarily each time; but on the oxygen being discontinued they very soon got as bad as before. Ice-bags had been almost continuously on his head from the time of the commencement of delirium, in addition to a blister on the back of his neck.

On the 2nd of July from the rapid onset of acute delirium and the increase of respiration along with the marked cyanosis a most unfavourable prognosis was given. Sleep was unfortunately out of the question that night owing to the hideous noises of a Chinese procession on shore. Several times the patient dozed off only to be awakened by the sound of an extra hundred crackers blazed off being wafted over the calm waters of the harbour, and which the patient even in his delirium complained bitterly of. The aconite and antimony were left off whenever the pulse began to get dirotic and stimulation commenced.

Case V.—English. *Æt.* 26.

On the 26th of June at 2 p.m. was requested to see this patient, found him suffering from plague and had him removed to the *Hygeia* at once. *History*:—On the 23rd June felt quite well. On 24th of June at 10 a.m. felt feverish, temperature 102° F., same evening 105° F. Noticed slight swelling in left femoral region. On the 25th knocked off work. Treatment on admission: calomel grs. x. and later on liquor morphinæ m. XL., milk, eggs, brandy, Brand's essence *ad lib.* Had a fairly good night.



On the 27th quinine pill grs. v. three times a day ordered. Tepid sponging every two hours and liquor morphiae m. xxx. at 9 p.m. On the 28th morning, pulse slightly intermittent and tendency to delirium; tr. digitalis m. xii., sp. ammon co. m. xxx., tr. cinchon co. m. xxx. ordered every four hours.—No sleep during the night. On the 29th delirium marked; pulse still slightly intermittent. Hyoscin hypodermically gr. $\frac{1}{100}$.

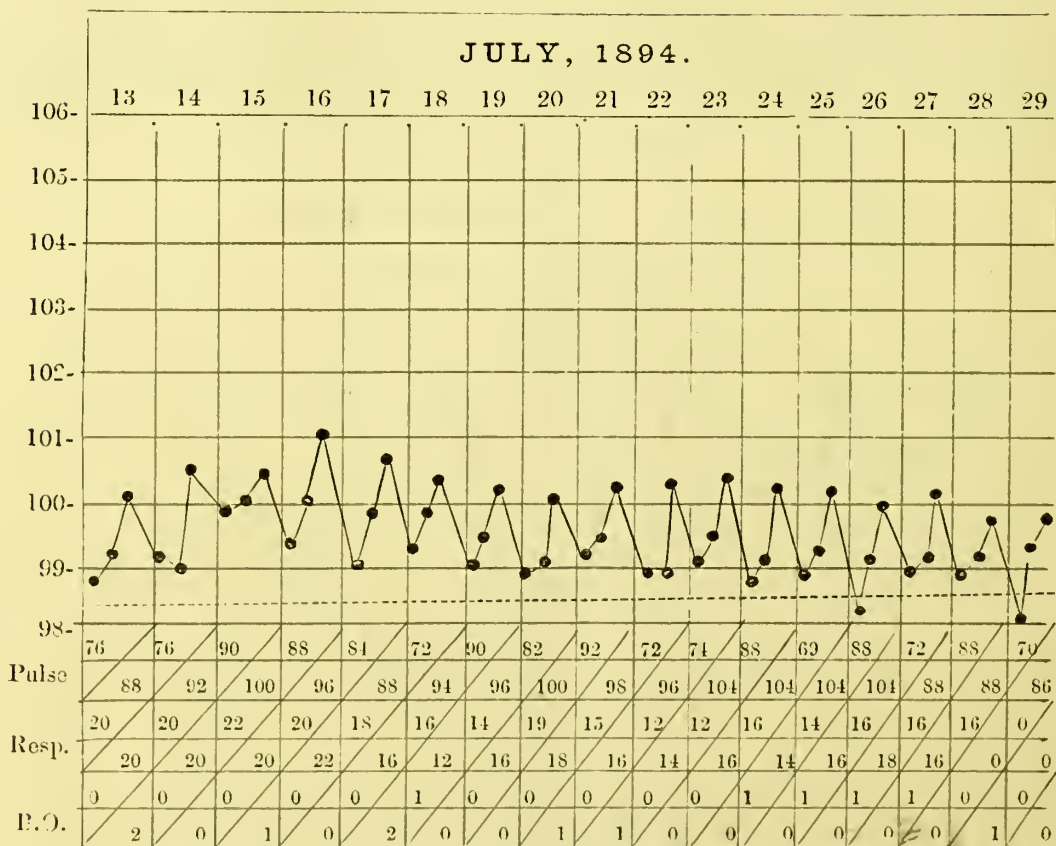
On the 30th at 2 a.m. he had another gr. $\frac{1}{100}$ as he had not slept at all and was continually wanting to get out of bed. At 9 a.m. has had no sleep, pulse very irregular now; pupils widely dilated, (? Hyoscin). 12.30 p.m. had grs. x. bromide of ammonium.

1st July at 3.30 a.m. he had gr. $\frac{1}{8}$ morphine. "He repudiates the ice-bag"—pulse intermittent, and anacrotic—no rebound wave by sphygmograph. The morphia had no effect in quieting him and at 4.30 a.m. he had a hypodermic injection of gr. $\frac{1}{75}$ hyoscin. After this he slept for over an hour. At 10 a.m. urine was drawn off by catheter, highly coloured, ammoniacal, deposit of mucus, trace of albumen, and deposit of phosphates (by microscope). The digitalis and ammonia mixture continued as before. At midnight he at last got a good sleep and slept until 5 a.m., morning of the 2nd July; pulse still intermittent—no lung complications; taking his nourishment well; ammonia and digitalis mixture continued and grs. iiss. quinine instead of grs. v. three times a day. No sleep at night. July 4th, situation unchanged.

During the night of the 5th as the pulse had improved though still intermittent, the digitalis was left out of the mixture. No sleep. Until the night of the 7th condition got worse. Low muttering delirium, and his pulse was now very bad, stimulants being given freely. On the evening of the 7th he had a hypodermic injection of hyoscin gr. $\frac{1}{75}$ and slept until about 7 a.m. on the 8th. This seemed to be the turning point for on the 8th he was much better and was put upon strychnin and iron, in addition to the cinchona and ammonia.

On the 12th the bubo was opened and a large amount of pus evacuated. On the 16th ammonia and cinchona three times a day was the medicine he was getting. His pulse was still somewhat intermittent but otherwise much improved in quality. On the 18th extract of malt three times a day ordered. On the 20th he was ordered tinct. strophanthi m. x. and liq. strychnin m. v. thrice a day under which the condition of the pulse rapidly improved.

On the 5th of August cultivations from and microscopic examination of blood and bubonic discharge showing no bacilli, he was removed to the Civil Hospital. At this time there was some considerable enlargement of the glands along the iliac vessels and as there had been a great amount of sloughing in the upper part of the thigh careful surgical attention was necessary. The mass in the iliac fossa remained large and indurated for over a month and was opened by Surgeon PENNY whilst I was in Japan, whilst several other openings were made afterwards. A long and tedious convalescence terminated by his discharge from Hospital on December 2nd, the most of the swelling having disappeared and the scar being firmly healed.

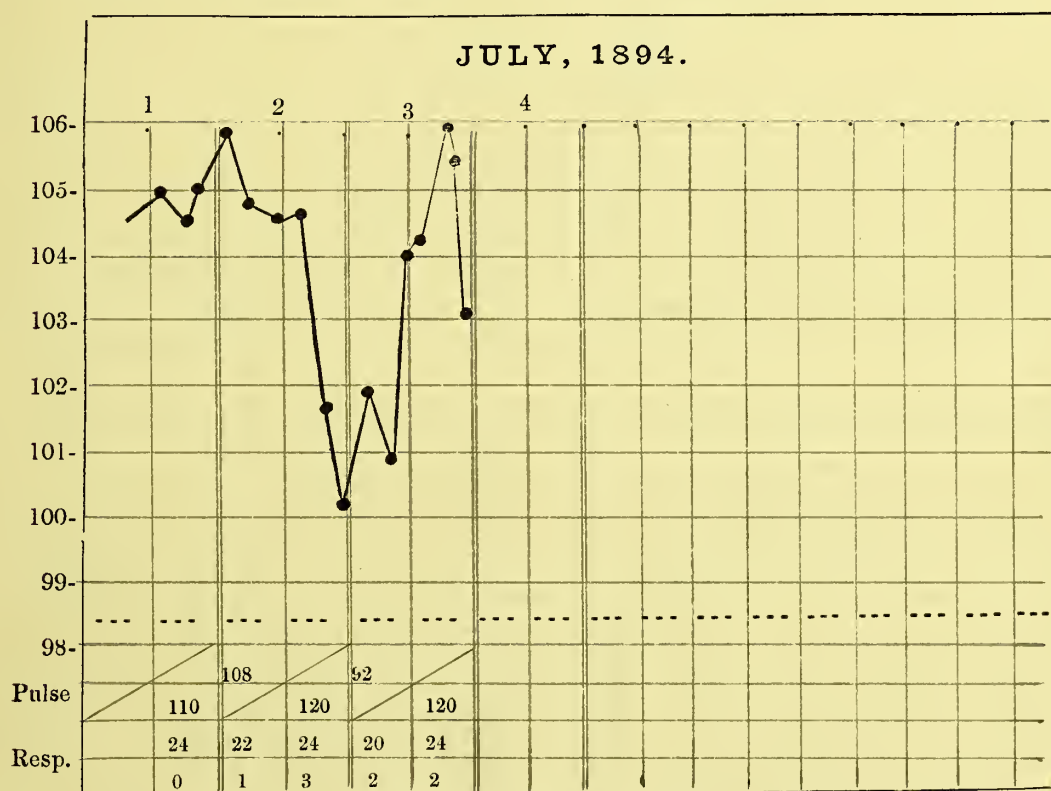


Remarks.—This was a most tedious and anxious case up till the end of October. The enlarged iliac glands (the induration round which extended to within an inch of the umbilicus) gave rise to considerable anxiety and obstruction of the bowel, which necessitated urgent manual measures on several occasions. The femoral artery lay bare on the surface of the callous ulcer for a long time

and at one period it was a question whether the external iliac artery should be tied for fear of serious hæmorrhage, as had occurred in two fatal cases. There was also some cystitis which persisted for a considerable time. The cardiac condition improved slowly—the intermittency persisting for at least two months. On December 31st he was examined again and his pulse although not intermittent was very irregular—no valvular disease of the heart could be detected.

Case VI.—Eurasian. *Æt.* 18.

Became feverish on the morning of the 1st July. A right femoral bubo developed during the day and he was removed to the *Hygeia* on the 2nd. Treatment: nourishment; ammonia and cinchona every two hours; phenacetin grs. v. every four hours, if temperature above 103° F., quinine grs. v. thrice a day and sponging frequently with water at temperature of 75° F.



On the 3rd he was delirious, complaining of being cold and the sponging was left off. Skin was moist and clammy; and there was a considerable degree of cyanosis; he had no sleep during the night; always wanting to get out of bed; plague pulse, but not intermittent. Ammonia and cinchona every two hours as before and quinine grs. v. three times a day. At 7.30 p.m. the temperature was 106° F. and he was now sponged, but without much effect in reducing the temperature; his pulse was still fairly good though dicrotic but not intermittent.

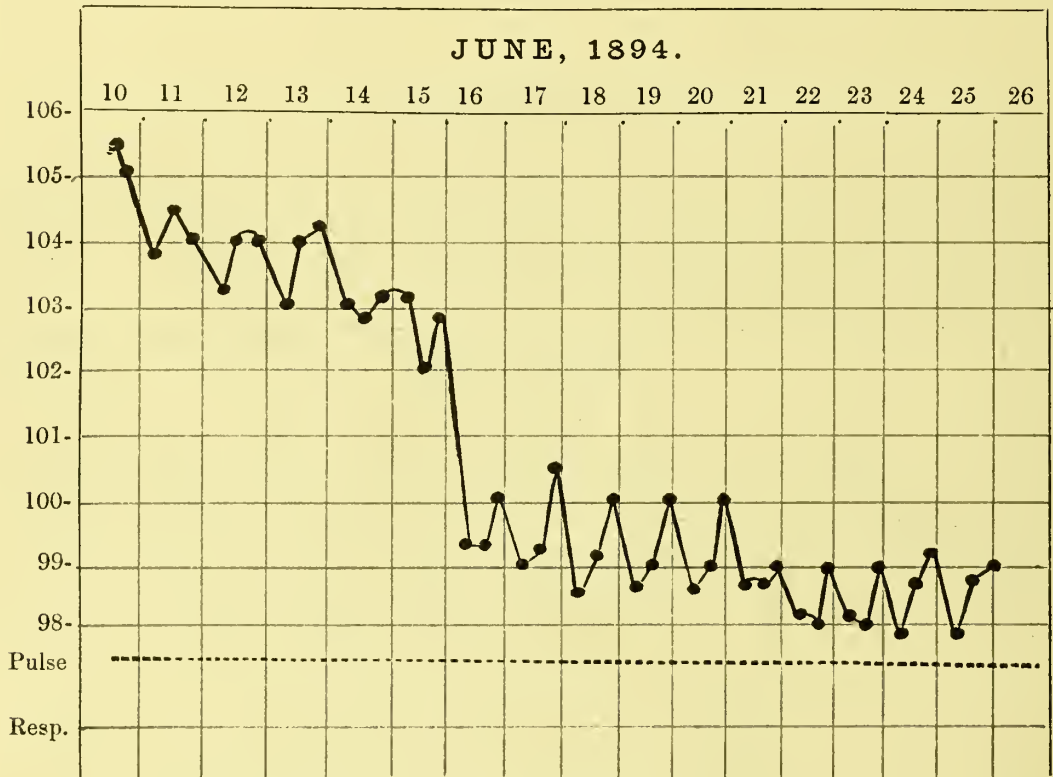
At 2 a.m. on the 4th while the Sister was calling me to see another patient, he got out of bed to go to stool, his attendant having gone to procure ice, and when I went into the ward the attendant was putting him into bed. I found him pulseless and moribund. He had ether injections frequently, hot mustard and water to the heart, ammonia to the nostrils; but all of no avail and he died at 2.30 a.m.

Remarks.—The rapid onset of delirium in this case and the extreme cyanosis which developed on the third day betokened a fatal ending, but the mere coincidence of the attendant and the Sister having to leave the ward at the same time brought about an earlier death than was anticipated. At this time we were able to give an attendant to each bad case on the *Hygeia* in order to prevent as far as possible any accident occurring. It was noticeable that there was a greater tendency to heart failure in Asiatic patients than in Europeans. In this case also the delirium was low, muttering and stupid from the commencement—I much prefer a trace of violence with a tendency to argument, in which case the patient's vitality is generally considerable and there is not the rapid succumbing that is so often seen when the delirium partakes of the stupid dazed type. Note in this case the fall of four

degrees of temperature after two five-grain doses of phenacetin, one example of what I have noted elsewhere in this report that in a severe case when the temperature is affected readily to this extent by antipyretics it is not a favorable sign. It shows, I think, that the circulatory system is in a condition where it cannot stand much depressing influence.

Case VII.—English. Æt. 23.

This man was on the whitewashing party for twenty days before becoming ill. Felt sick with slight shivering on 8th June. On the 10th June admitted to the *Hygeia*, with vomiting, temperature 105° F. no headache, small femoral bubo in left groin, yellow furred tongue, pulse full and bounding, but yet easily compressible.



Between the 10th and the 13th the bubo increased very much in size, having a boggy feeling and with a good deal of surrounding redness. It was also very painful. Treated by lead and opium the inflammatory appearance disappeared in four days. On the 21st the bubo was opened and there was a considerable amount of pus evacuated. Treatment:—tepid sponging, quinine grs. v. three times a day. Bromide of potash grs. XL. and hydrate of chloral grs. xx. every night during the period of delirium with plenty of iced beer and usual nourishment. Discharged on the 27th July.

When examined in the beginning of December this patient is found to have very tumultuous action of the heart which is most irregular at times. There is no bruit to be discovered. The apex beat is just outside the nipple line. The pulse is 122 when sitting at rest, and irregular. He appears very nervous and shaky. He frequently suffers from headache, but evidently of not so severe a character as his fellow soldiers. The spleen shows no enlargement. There is an occasional cramp of the muscles of the front of the left thigh, evidently due to some implication of the anterior crural nerve in the cicatrix. He frequently suffers from shortness of breath and palpitation, more especially when marching up a hill.

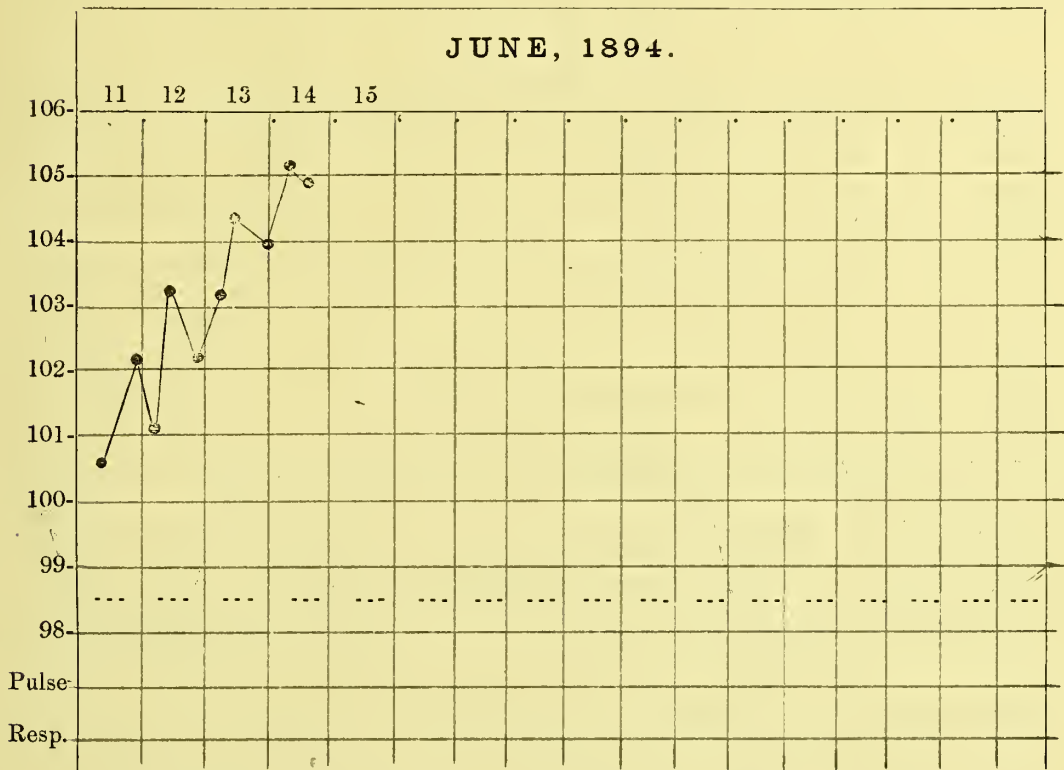
Remarks. This case was one which showed a great amount of after-change in the nervous mechanism of the vascular system and led one to suspect that the enervation of the heart had been permanently affected by the disease.

Case VIII.—Chinese. Æt. 38.

Was admitted to the Government Civil Hospital on the evening of the 8th June, suffering from incised wound of the scalp about six inches long with severe hæmorrhage. The woman fainted whilst in the receiving room. The wound was caused by her falling down stairs. On the 9th she was very stupid but did not have the appearance or symptoms of a patient with compression or concussion of the brain. On the evening of the 9th plague was diagnosed and she was removed on the following morning to Kennedytown where she died the same evening from plague. It was remarkable how very few similar accidents occurred. Here there was no fracture of the vertex and

no sign of any fracture at the base of the skull. The only thing that was remarked, when she was admitted, was the extreme difficulty in stopping the hæmorrhage and even after the wound had been stitched up a considerable amount of oozing took place. Her stupid condition for the first twenty-four hours was attributed to the loss of blood, but as undoubted symptoms of plague developed on the evening of the 9th the falling down stairs, the fainting-fit and the copious hæmorrhage were all explained.

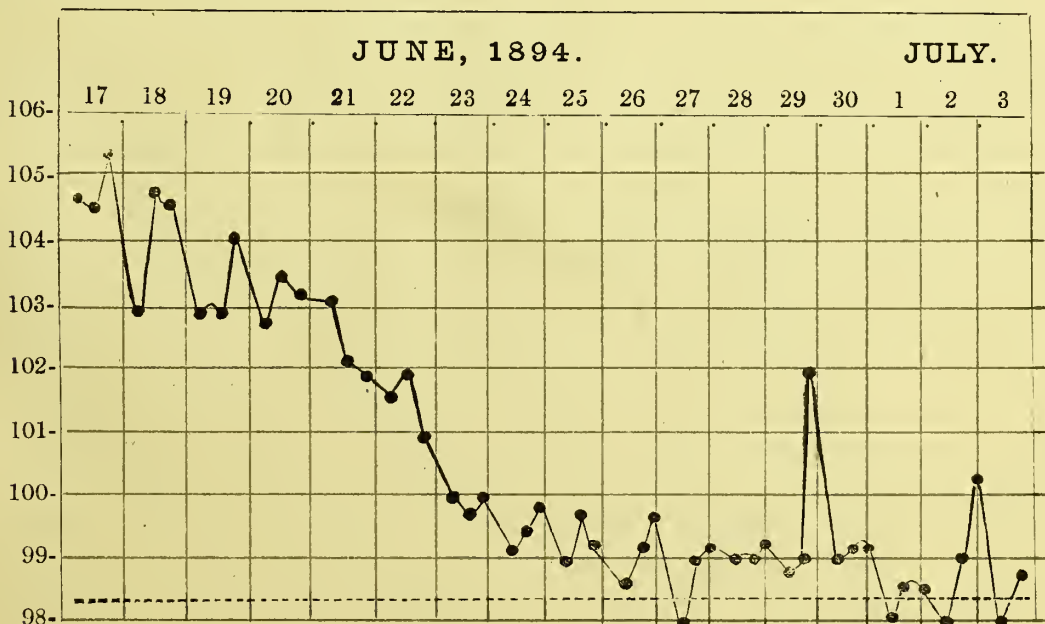
Case IX.—Parsee. *Æt.* 22.



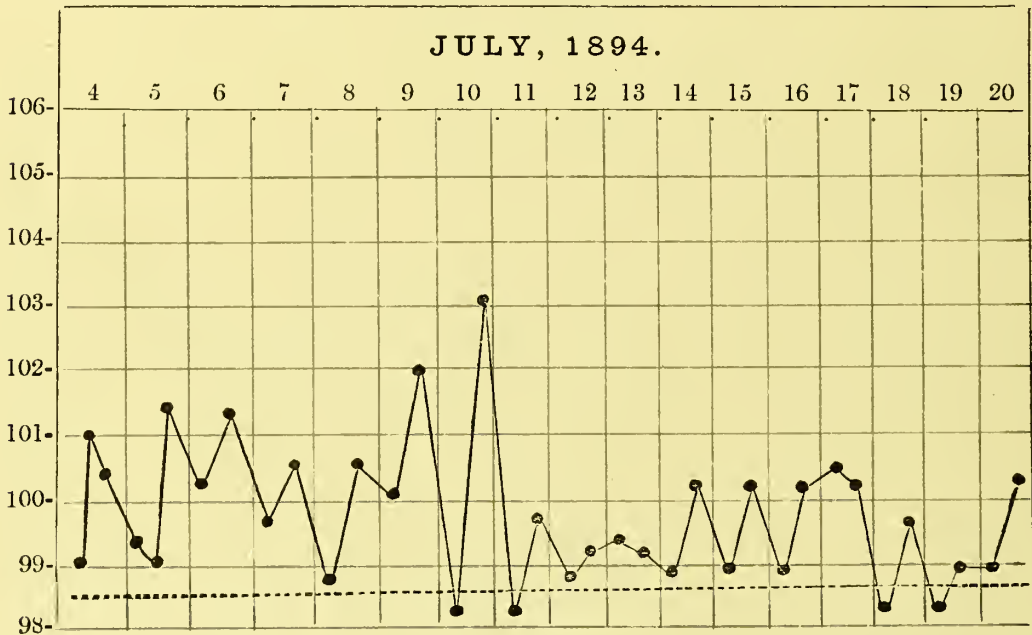
This chart is an exception to the rule as here it took four days at least for the temperature to reach the primary maximum. Such a long time was very rare indeed during the epidemic, almost every other case reaching the primary maximum within forty-eight hours.

Case X.—Chinese. *Æt.* 28.

Admitted 17th June, 1894 with fever and vomiting during the previous twenty-four hours. Right femoral bubo, no headache.



On the 22nd, five days after her admission, a well marked lymphangitis was noticed on the dorsum of the right foot. A small sore between the first and second toes being noticed; this was not visible the day before. The lymphangitis rapidly spread, until it reached up to the femoral bubo. I never noticed a case of plague where lymphangitis preceded the bubo; several cases were sent in with lymphangitis supposed to be suffering from plague, but all of these were not cases of plague. Of course it is difficult to say that there was never lymphangitis before lymphadenitis and when the statement is made that lymphangitis, when it did occur, always followed the inflammation of the gland or glands, it is meant that no redness along the line of the lymphatics was apparent, no hardness was noticed, and no uneasiness or pain felt. The lymphangitis on the postero-internal part of the leg went on to suppuration with extensive sloughing extending from the level of the internal malleolus to the knee and required free incision. After a lengthened convalescence she was discharged on August 20th, repeated attacks of lymphangitis above the knee having occurred for two or three days at a time during that period.



Case XI.—Indian. Æt. 20.

Was admitted for observation on the 22nd June, having suffered for the previous twelve hours from headache which he thought was due to malarial fever and in consequence had treated himself with quinine. He was suspected of having plague by Dr. STEDMAN as he was an inmate of a house which had already supplied us with two patients. On the morning of the 23rd the following note was made. "A right cervical (parotid) bubo appeared during last night and is now very large." During the course of the day the surrounding oedema became very great, extending almost right round the neck and swallowing was a matter of extreme difficulty. The breathing was also considerably embarrassed and he rapidly sank dying at 8 a.m. on the 24th.—His temperature chart is subjoined.* The fall in temperature was caused by phenacetin grs. viii and was another instance of a bad case, easily affected by antipyretics, rapidly proving fatal. The end was sudden, as after passing a motion in the bed pan he turned over and died.

Case XII.—Jewess. Æt. 24.

Admitted at 8 p.m. on 30th June, with an enlarged gland on the left side of the neck. (Temperature chart as follows.†) The history which we got of this case was as follows. On the 24th June, she first became ill "giddy and swimming in the head." On the following morning she had a temperature of 105° F. She had quinine and phenacetin. On the evening of the 26th she had slight vomiting and pain in the chest and was prescribed a mixture of acetate of ammonia, antipyrin and digitalis. On the 26th she was "very bad." It seems that about the 21st June, she first began to pass blood in the urine and after that day blood was almost constantly present in the urine until admission. On the morning of the 30th the swelling on the left side of the neck is said to have commenced. Menstruation finished on the 23rd and returned on the 27th for one day only. One year ago she had a child, a well marked mitral bruit being present at the time of confinement.

On examination on the 1st July she complained of a general pain or soreness confined to the left half of the body. On palpation of the left kidney she complained of pain on pressure and mentioned that she had frequent attacks of pain there; no pain over the right kidney. There was some tenderness over the left ovary; there was a well marked regurgitant mitral bruit—no oedema of the lower extremities. The gums, lips and conjunctivæ blanched. No bacilli were found in the blood by KITASATO. No blood was now found in the urine, only a deposit of mucus. Diagnosis suspended. July 2nd: complained of much pain in left hip shooting down the leg again. No bacilli found by KITASATO. Diagnosis "not plague." July 8th: deep fluctuation in the abscess of the neck; a small incision was made, but no pus was evacuated on account of the patient's violent behaviour. On July 10th chloroform was administered and pus evacuated from the centre of the gland, a small drain-

* Temperature chart has been lost since this was written, the fall mentioned was about 4° F.

† This chart has also gone amissing.

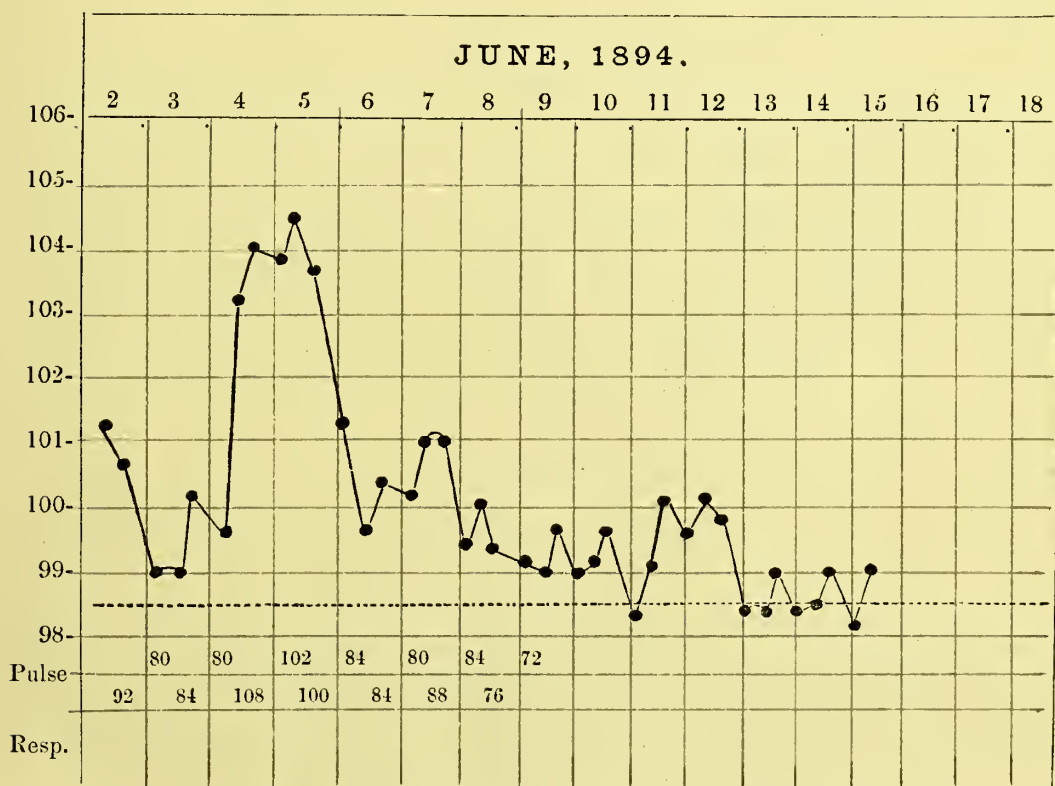
age tube being inserted. On this date KITASATO again failed to find bacilli in the blood. August 3rd: the glands on the right side of the neck were slightly enlarged but these went down under lead and opium fomentations. She was kept under observation in a separate ward by herself until August the 8th when she was discharged.

Remarks.—This was a difficult case for diagnosis. The case was sent in by three medical men as a case of plague. Surgeon PENNY who saw her first in hospital had doubts as to the correctness of this diagnosis and on the following morning Dr. MOLYNEUX and myself saw her in consultation with him. The reasons why we thought it *not* a case of plague were absence of facies and anxiety generally met with, tongue clean, no cerebral symptoms such as she would be sure to have had after a week's illness if suffering from plague—in fact it was quite the reverse, she was perfectly clear in the head and rational. The pulse was also different from either of the types usually met with in the later stages of plague. The history of the case looked as if she had been suffering from renal colic whilst the enlargement of the gland was, I believe, a coincidence. Hysteria was also well marked.

On the 9th July KITASATO also examined some of the discharge from the wound made in the gland and found *no* bacilli, but as iodoform had been applied freely the day before, no value can be attached to this observation. On the 10th, when under chloroform and the gland could be freely exposed, it had a totally different appearance from that of a plague-infected gland. Instead of being of a dark blue colour and soft in consistence it was yellow with an outside zone of hardness, which enclosed a cheesy purulent centre and while operating I thought that it must have been of somewhat longer duration than eleven days. Besides this the fact that frequent and careful examination of the blood by KITASATO proved negative further convinced us that the case was not one of plague.

Case XIII.—English. *Æt.* 23.

Admitted 2nd June with a temperature of 101° F. A right inguino-femoral bubo. Slight frontal headache. First became ill same morning. Temperature chart as follows:—



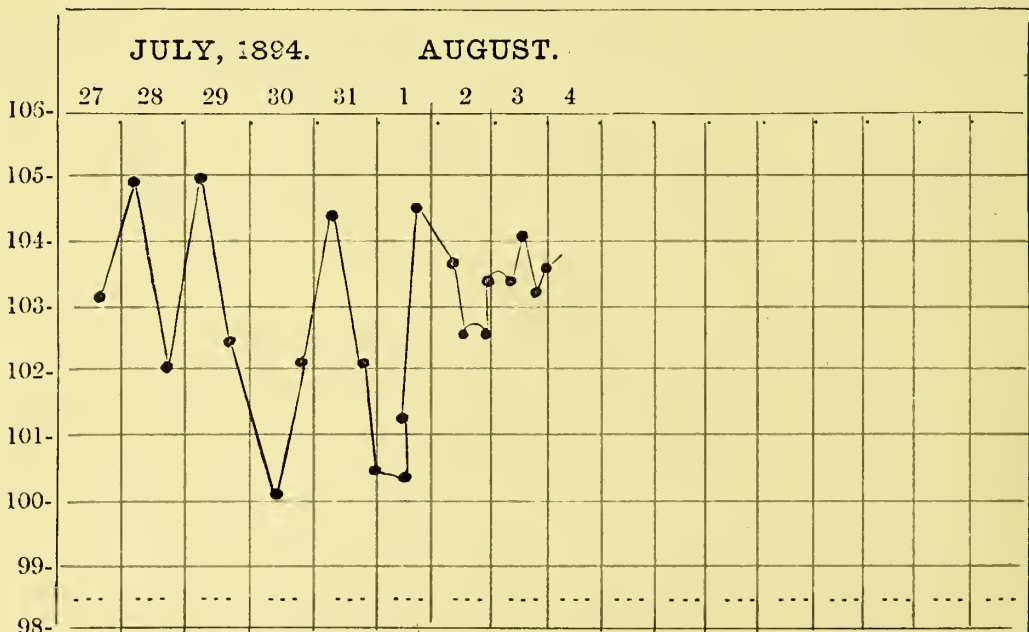
During the 3rd of June his temperature was practically normal and led us to doubt the accuracy of diagnosis. No antipyretics had been administered. On the morning of the 4th, however, his temperature shot up to 104° F. and he rapidly became delirious. On the 5th his condition was much worse—pulse dicrotic, and very delirious. Has not slept for three nights. Treatment now ice-bags to head and nape of neck, tepid sponging, quinine grs. x three times a day and at 9.30 p.m. he had $\frac{1}{3}$ grain morphia hypodermically, after which he slept most of the night. As will be seen from his temperature chart he rapidly improved and was discharged on the 27th July. The bubo suppurated and had to be opened about the 11th.

On being examined early in December it is found that he has never regained his lost weight and he is now over a stone lighter than he was before disease attacked him. There is some enlargement of the cardiac dulness, the apex beat being just outside the nipple line. He has slight enlargement of the spleen, but has suffered frequently from ague. He is often troubled by occipital headache which is occasionally severe; and has had, on several occasions, to fall out of parade. He is very nervous and apparently easily excited and to a medical eye is evidently not the same man physically that he was. His pulse, however, is not nearly so fast as No. VII's, varying between 90 and 96.

Remarks.—As already mentioned, the temperature on the second day was somewhat peculiar and no other case during the epidemic showed a practically normal temperature for almost the second twenty-four hours of the disease. He was seen by Dr. HORDER of Pakhoi on admission, who concurred in our diagnosis, and he was also somewhat surprised to note this temperature. Had we not seen this man on the 2nd when his temperature was 101° F. it is quite possible that this case might have been put down as one where the bubo was apparent forty-eight hours before the fever began. It is to be noted also that when the temperature again went up on the 4th, the onset of delirium was particularly rapid. The want of sleep during the first two nights, I think, was caused by the anxiety on the part of the patient which necessarily was present in every European case, and which was more than usually well marked in this man. The other soldiers who suffered from the disease were examined at the same time as the two Cases VII. and XIII. One suffered from occasional occipito-cervical pain and shortness of breath whilst another had a tumultuous action of the heart with irregular pulse and frequent vertical headache. The urine of all was normal, no albumen. Although these men were discharged from the *Hygeia* on the 27th July some of them had to remain a considerable time in the Military Hospital on account of the indolent character of the ulcers left after the buboes.

Case XIV.—Enrasian. *Æt.* 49.

On August 3rd some blood was sent for examination and as plague bacilli were found in it the patient was removed to Kennedytown. *History:*—Was at the Alice Memorial Branch nursing on Saturday, 21st July. She has had fever for eight days. Temperature chart affixed. Her tongue showed the typical advanced condition of plague. Dyspnoea was considerable and the pulse very feeble and slightly intermittent. There was no bubo to be seen. She complained of considerable abdominal pain about the umbilicus. She died the same evening.



Post mortem examination on the following morning was partial; the spleen was soft and slightly enlarged, there were no externally visible swollen glands in the femoral, axillary or cervical regions, but there was a considerably enlarged and congested mesenteric gland almost directly situated at the seat of pain; in addition there were several other glands which were enlarged but not to such a considerable extent as the one before mentioned. There were no hæmorrhages in the abdomen. Bacilli were numerous in the glands and spleen. There was no inflammation of the intestines or stomach and no hæmorrhages on the mucous surface of the latter organ.

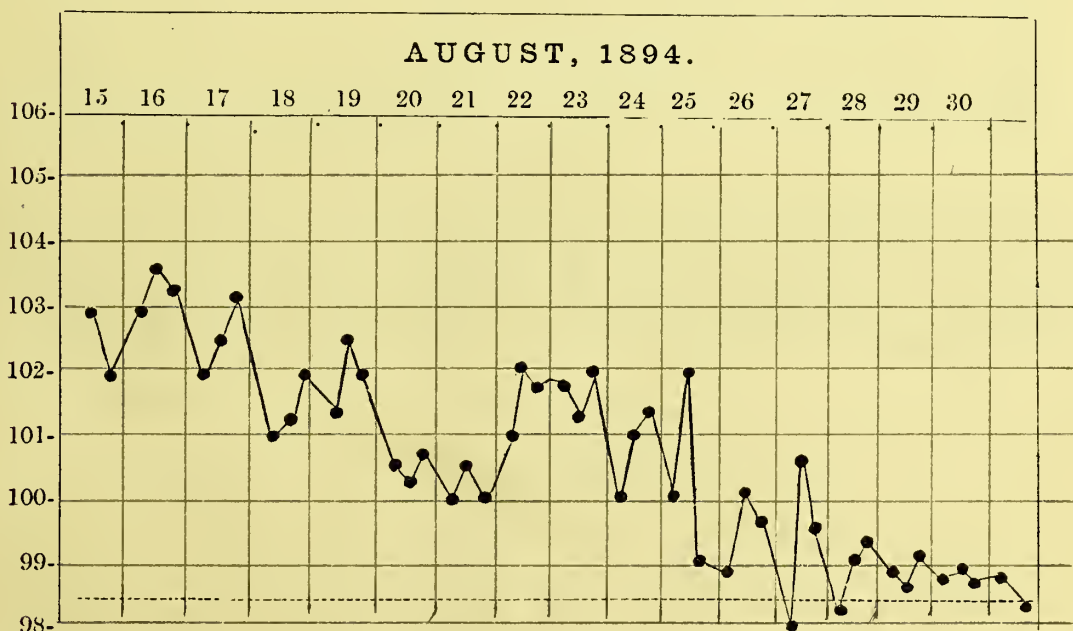
Case XV.—Chinese. *Æt.* 21.

Was admitted on August 7th. This patient was sent by Surgeon-Major JAMES from the Tung Wah Hospital. On arriving at the Government Civil Hospital for bacteriological examination of the blood, he had a convulsion. Bacilli were found in the blood, so he was sent down to Kennedytown. He had never had fits before. Had been sick for three days. On examination it was found that he protruded the tongue to the left side—the left leg and left arm were paralysed; pupils equal; left side of palate also paralysed; the left facial nerve apparently not affected. After the convulsions he was immediately conscious, and before they occurred he could sometimes tell that they were coming on. During the last two days he has had numerous fits. There was no involuntary urination. "He says a fit is now coming on and he thinks so because of a feeling in his chest. During the fit, the eyes are turned to the left. The muscles of the paralysed left limbs jerk somewhat but not enough to raise the limbs off the bed as they do on the opposite and sound side. The mouth is drawn over to the left side and the head jerks over to the left side also. During the fit the pulse is rather weak and remains so for a short time after." On the 8th the paralysis of the previous day had become only

paresis and the tongue when protruded did not come out so much to the left. There was slight paresis of the left facial nerve on this date and the fits were not nearly so frequent. 9th August: had only one fit during the night and one during the morning up to noon. He now lies all the time with an india rubber ring to bite or insert between his teeth. He had a large number of short fits on the morning of the 10th, but they were of much shorter duration—the longest only lasting for about half a minute. The grasp in the left hand was now fairly good, but could not perform fine movements with his fingers. These short fits gradually diminished in number and on the 16th it was noted that they are confined to irritation of the leg muscles. He was now very drowsy; this was ascribed to the amount of bromide of potash that he was then having, grs. xxx. four times a day. On the 26th it was noted that there had been no twitchings of the leg muscles for about four days, and the patellar reflexes were somewhat exaggerated. There was no albumen at any time in the urine—he never had a fit before his attack of plague and never had one after 26th of August until the day of his discharge. *Remarks*:—Any diagnosis in this case is difficult to make; evidently a unilateral lesion was present, but its exact location is doubtful. With the experience of Case XVII in mind it is quite possible there was no hæmorrhage. Here the man's cerebral condition between fits was good, while Case XVII was unconscious all the time, and I do not think there were enough symptoms of meningitis to say that it was severe enough to account for the above condition. On several occasions the convulsion distinctly commenced in the left thumb and my opinion at the time was that a small hæmorrhage was present in the region of the "arm" centre at the upper part of the right fissure of Rolando, but I am afraid now this would not explain all the symptoms.

Case XVI.—Japanese. Æt. 23.

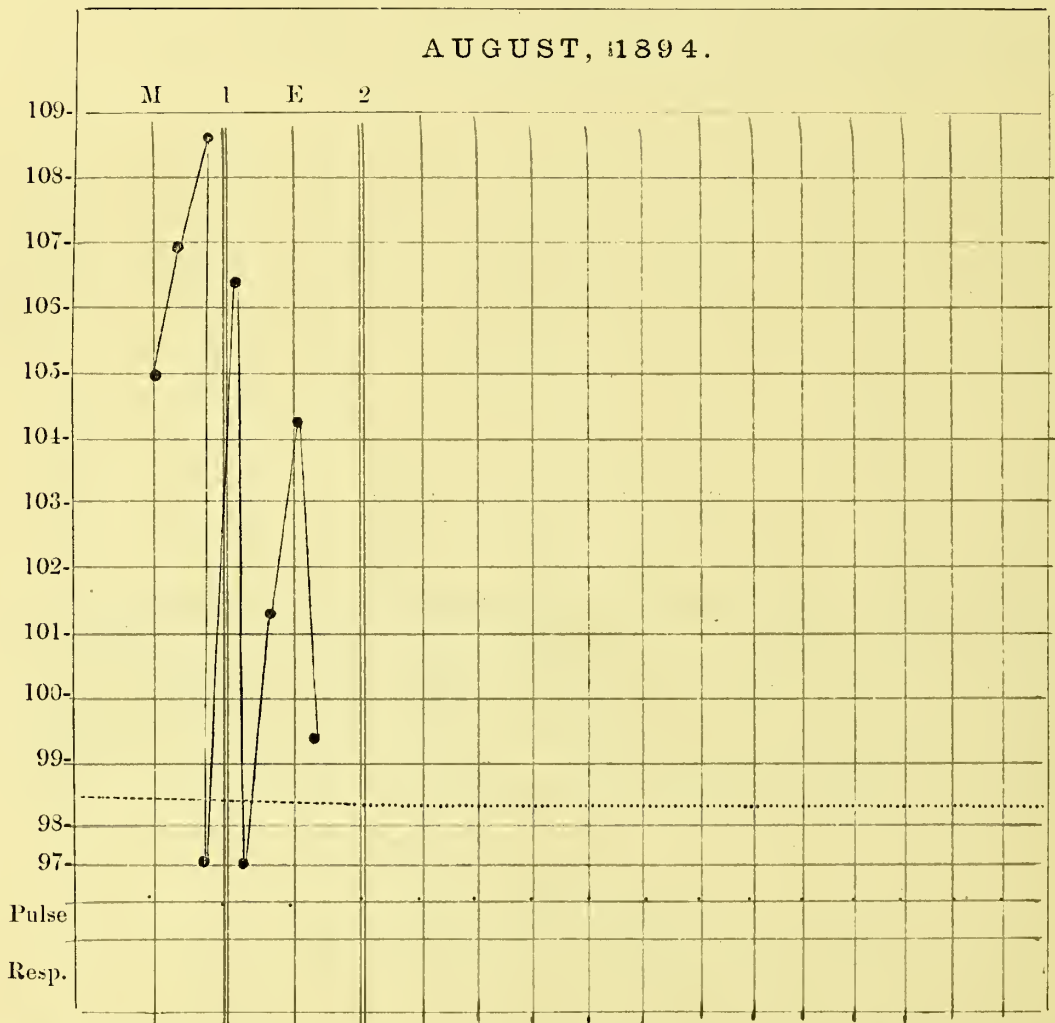
Admitted 15th August, 1894, with slight dyspnœa, headache, furred tongue, slight pain in the left femoral region and tenderness on pressure. Has had fever for some days. The glands in the left femoral region are slightly enlarged. Temperature chart. Bacilli were found in blood by Dr. TAKAKI on the day of admission. On the 18th a number of roseolar spots appeared over the upper part of the abdomen and chest, with gurgling and tenderness in the right iliac region. The bowels were constipated but stool was very light yellow, and the patient kept on fluid nourishment as typhoid was suspected in addition. On the 19th was seen by Professor AOYAMA who also said "typhoid." On the 20th again plague bacilli were found in the blood. There were several crops of spots. The patient was discharged well on the 11th October.



Remarks.—The only result we could come to in this case was that it was one of mixed infection, typhoid and plague. Typhoid is one of the most likely diseases to be mistaken for plague, when no history can be got from the patient. Patients brought in by the search parties often could not give us any assistance and in this case we were all the more cautious as on one previous occasion a diagnosis of plague was made when *post mortem* examination showed the disease from which the patient had suffered was typhoid but this was before the bacteriology of the disease was properly known.

Case XVII.—Chinese. *Æt.* 6.

Admitted 1st August, 1894, at 4 a. m. with convulsion, and temperature of 105° F. On admission had grs. iv. of phenacetin. I was called to see her at 8 a.m. and found her comatose with a temperature of 108.3° F. Recognized her as an out-patient seen two days before, who had complained of slight fever with a few blotches of what I took to be urticaria on her face, and for which small doses of quinine and magnesia were ordered. She was immediately put into a cold bath (75° F. at that time of year) which was cooled down to 55° F. by the use of ice. When the temperature had come down, on examination it was found that the right pupil was dilated and there was internal strabismus of the left eye. The head was turned over to the right side all the time. On pressure in the left groin, the left leg was drawn up slightly but as the child was unconscious nothing else could be elicited. As there was the possibility that it was a case of plague, the blood was examined by Dr. TAKAKI as well as myself without definite result;—but on some blood being withdrawn from the spleen by a hypodermic syringe numerous bacilli were found. A hæmorrhage in the brain was diagnosed but its situation could not be fixed. The child remained unconscious all day in almost the same condition, never moving at all, and died at 8.40 p.m.



The *post mortem* examination was made the following morning. The left femoral region was first cut down on through about half an inch of fat, and a solitary dark blue enlarged gland about the size of a walnut was found. There were no glands enlarged in the right femoral region. There were numerous mesenteric glands inflamed and slightly enlarged: the spleen enlarged and follicles swollen. The meninges were intensely congested as was also the superficial brain matter in proximity, especially the Pons Varolii and Medulla. No hæmorrhage was found after exceedingly careful examination.

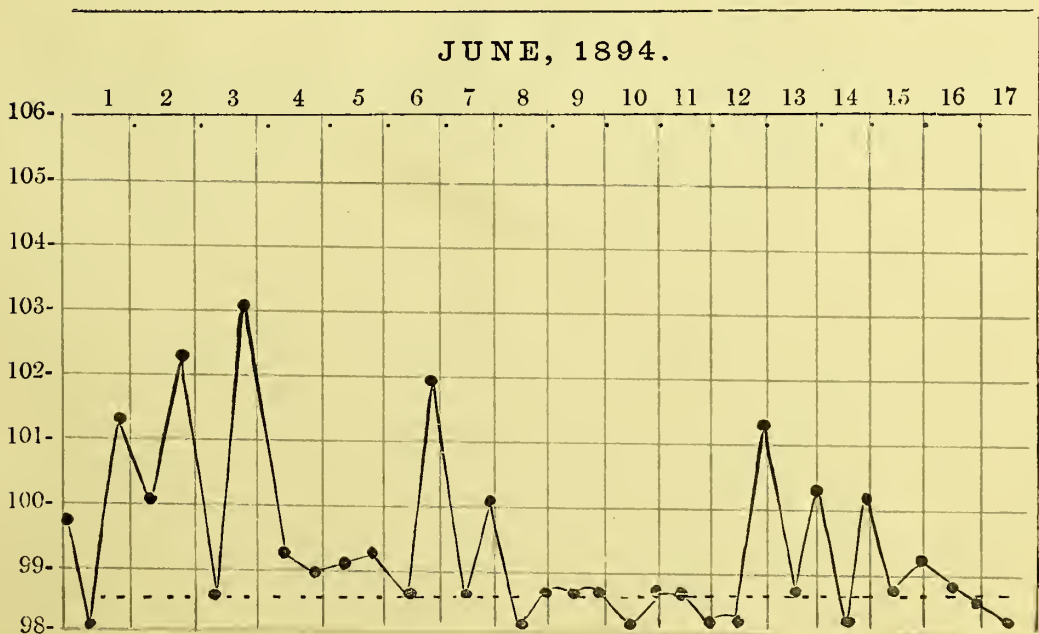
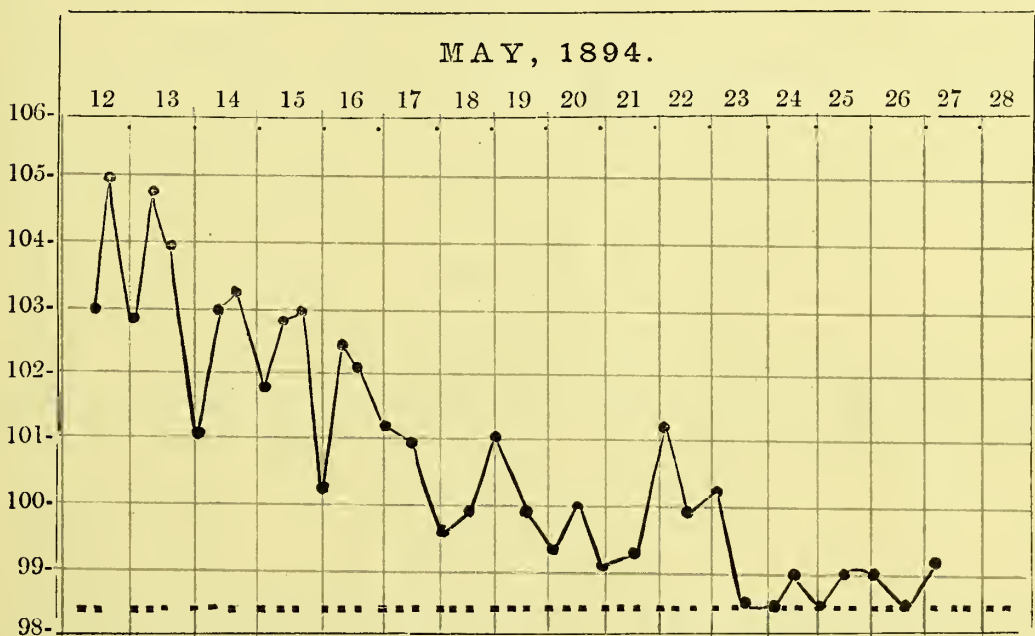
Case XVIII.—Chinese. *Æt.* 53.

Admitted 12th May, 1894. Died on the 13th after having been five days sick. This was the first case we saw which had a hæmorrhagic bleb. The bleb was in the right femoral region and the bleb was situated on the outer side of the right ankle. It was about the size of a dollar and the epidermis rose gradually over the sanguineous fluid until the swelling seemed to have a height of about half an inch. From the time of his admission until the time of his death twenty-eight hours

later this did not increase in area, unfortunately we were not able to find out how long it had been in existence. There were no blebs on any other part of the body. The bleb when pricked a few hours before death showed a base similar in appearance to that seen in the vesicles of moist spreading gangrene. Another case admitted on same date, aged 42, presented two blebs on the right arm, which developed on the 14th May, and were of the same character. This man died the morning following their appearance.

Case XIX.—Chinese. *Æt.* 15.

Was admitted on the 12th May with fever and delirium. On the 14th buboes developed in the cervical region left groin and left axilla, all of which soon became very painful. On the 15th hæmatemesis occurred. On the 24th numerous abscesses, evidently pyæmic in character had developed in the right side and numerous situations on the head and neck. This man had also most severe diarrhoea. This was the first case we had where pyæmic symptoms were well developed.

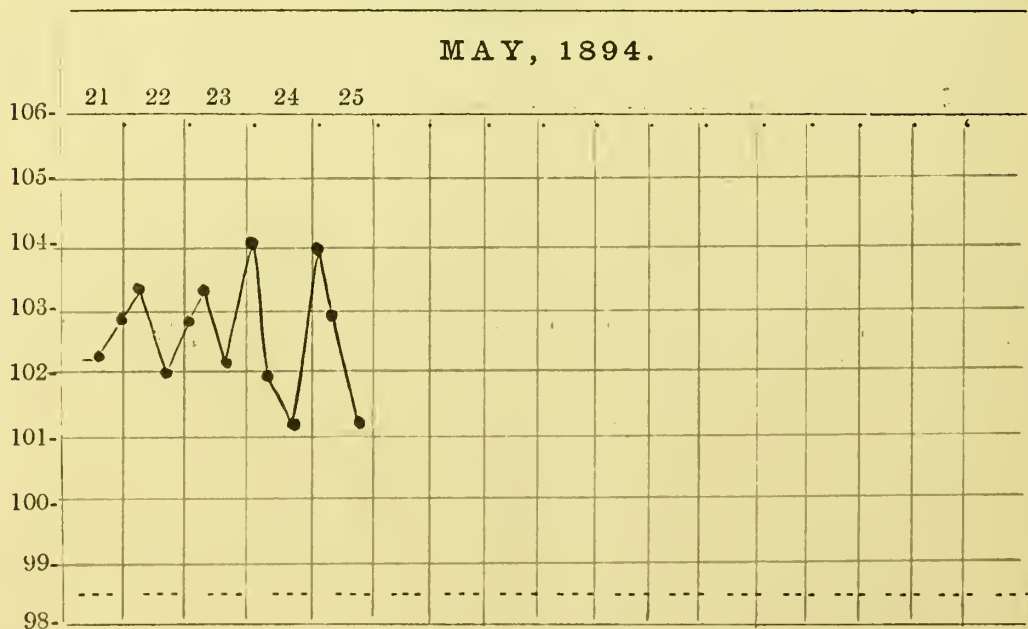
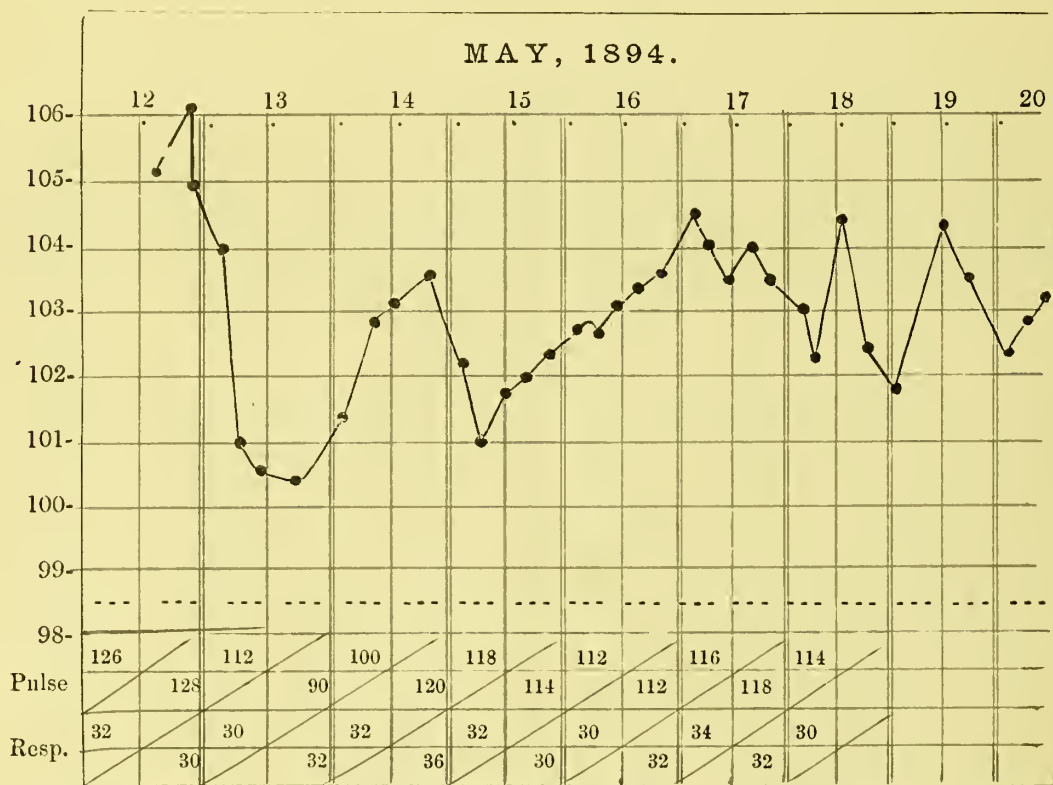


Case XX.—Chinese. *Æt.* 20.

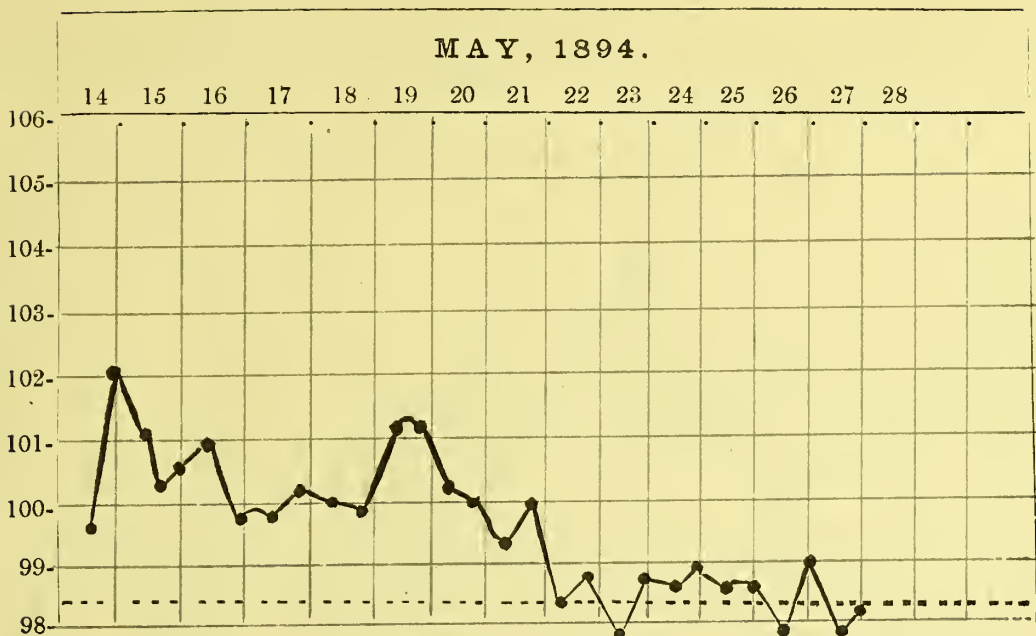
Admitted 12th May, 1894. This was a case where the respiration was very hurried before death. On the 13th May his temperature was 105° F. His pulse was 112. His respirations were 66, cyanosis extreme, his face being perfectly livid. He died on the 14th May. A short time before death with respirations 82 and pulse imperceptible. When the respirations go above 40 without well marked lung conditions to cause greater rapidity of respiration, then generally expect death.

Case XXI.—Chinese. *Æt.* 17.

Admitted 12th May, 1894, to the Government Civil Hospital with the diagnosis malarial fever. Treatment: antipyrin grs. x. every three hours if temperature above 103° F. and quinine grs. x. three times a day. On the 18th May although no bubo was apparent the case was diagnosed plague and he was removed to the *Hygeia* and on the following morning a cervical bubo appeared. The following was the temperature chart:—



and shows another case with a long period of pyrexia, but in this case, different from case No. XXIV, there was no lung complication. It will be noticed that the large doses of antipyrin given brought his temperature down almost six degrees in twenty-four hours, but at this stage he was very collapsed, and stimulants were ordered freely. Thinking over the case later, this collapse ought to have put one on the lookout for plague, as I have never seen a case of malarial fever collapse with the same amount of antipyrin; the doses given were, of course, very serious doses for a man suffering from plague. The bubo here did not appear for a week and immediately it did appear the man's condition became worse.

Case XXII.—Chinese. Æt. 24. F.

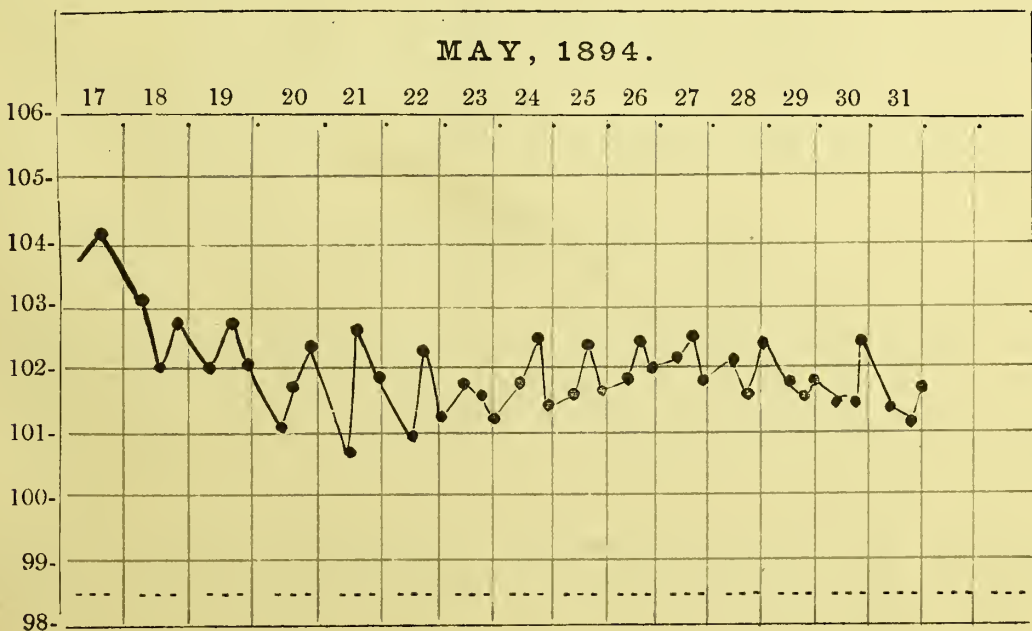
Admitted 14th May, 1894, with well marked plague. On the way to hospital had vomited a considerable quantity of blood. Notwithstanding this the pulse was still full, though rapid. On the 15th she had hæmorrhage from the gums. On the 16th she had more hæmorrhage from the gums and considerable hæmorrhage from the vagina. The breath was most offensive, having a smell like that of a patient seized with hæmorrhage from a gangrenous lung. This patient had petechiæ on the arms and face and curions to relate, on the 24th May, extensive desquamation of the skin in several parts of the body was evident, but I do not think that this can be put down as a result of the plague. This woman's skin was always dry and rough, in addition to being very dirty when she came into hospital, and I have seen many similar cases in Chinese which I can only describe as dirt desquamation. No special treatment for the hæmorrhage was given. The delirium in this case was very slight and it is just possible that this to some extent is accounted for by the considerable amount of blood which she lost. She was discharged cured.

Case XXIII.—Chinese.

Admitted on 16th May died on the 19th. The temperature after death rose to 108° F. the end being very rapid, and this was the nearest approach to death by hyperpyrexia that I saw during the epidemic.

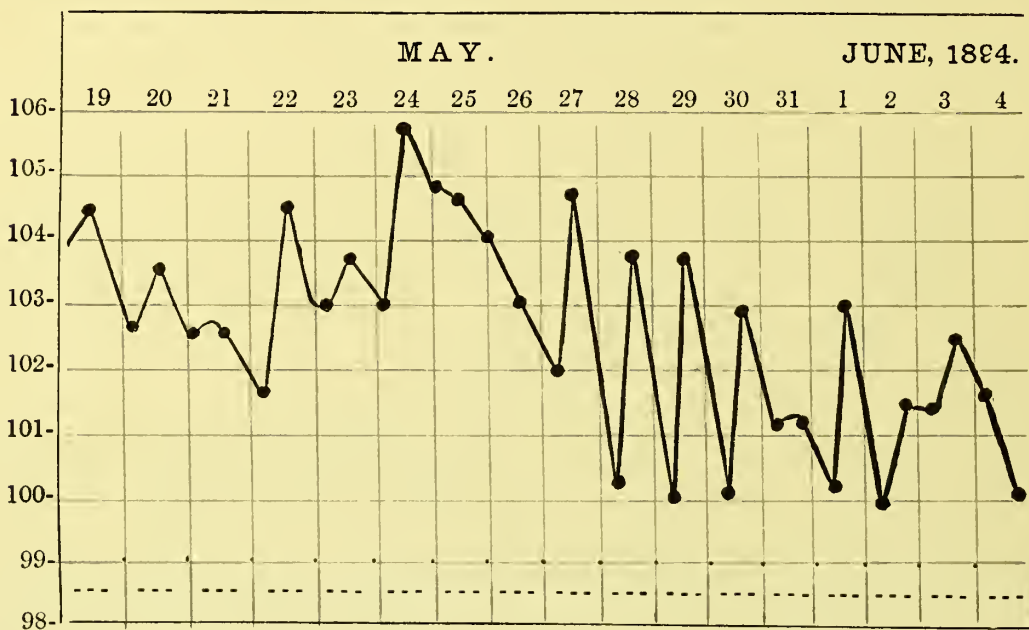
Case XXIV.—Chinese. Æt. 18.

Admitted 19th May, 1894. Showed the following temperature chart. He died on the 31st May. This was a long period of pyrexia, complicated by boils (pyæmic abscesses) appearing on the 20th, and hæmoptysis on the 26th with considerable consolidation of the left lung. In this case I consider that the pyrexia in the later stages was due to the pneumonic condition—probably pyæmic abscess of lung.



Case XXV.--Chinese. *Æt.* 14.

Admitted 19th May, 1894. Showed the following temperature chart. In the first instance had a right axillary bubo and the notable point in her history was that on the 2nd June, fresh buboes in the right groin and left neck appeared which increased to a very considerable size and which in addition to the primary one suppurated.

Case XXVI.--English. *Æt.* 45.

Admitted to Civil Hospital 31st May, temperature 104° F. rising to 105° F. in the evening. Right axillary bubo with very great surrounding œdema developed during the night; removed to *Hygeia* in the morning. This was a very alcoholic subject who had been "on the beach" for some time and who was an almost hopeless case whenever delirium set in. He died suddenly at 3 a.m. on June 5th after using the bed pan. There were many enquiries as to how this man became affected and doubts as to the correctness of diagnosis were freely expressed by people who did not know that he had been wandering about the slums of Taipingshan for the previous fortnight.

Case XXVII.--English. *Æt.* 24.

Admitted 29th June, 1894. Sent in as a case of plague. Was found suffering from well marked lymphangitis and erythema of right leg, irritative bubo in right groin, temperature 102° F. Had been diagnosed on seeing bubo as plague. However, he had in addition a dirty foul ulcer on the dorsum of the foot which evidently was the cause of the above condition. He had none of the well marked symptoms of plague beyond "a bubo," and no bacilli were found in the blood or in the bubo. He had been a chronic alcoholic for some time. Under suitable treatment he got well in a few days.

Remarks.—This was one case of several sent in as plague, where evidently the practitioner sending them to Hospital either made a mistake or did not take sufficient time to make a careful examination, which was all the more necessary at that time as the moral effect of the announcement of "another European case of plague" was not reassuring to many European residents who were unable to get reliable information.

A CHINESE VIEW OF THE PLAGUE.

The following translation from a Chinese publication gives the latest theories and treatment of the plague, and as it is a peculiar document I give it in full. The translation has been kindly supplied by Mr. J. DYER BALL. It should be noticed that the author lays great stress on what one might term the "disinfection of the family well," I am convinced with a considerable amount of reason. Although the various wells through the City of Victoria are much better built than some of those I have seen in other Chinese places, and in the foregoing report I have given a guarded opinion as to the question of their pollution in Hongkong, still I feel pretty certain that in Canton these wells had a good deal to do with the propagation of the Epidemic. The treatment recommended closely resembles what I saw in the Chinese Hospitals here and represents the most advanced views of Chinese Medicine.

*Notification by Planchette by the God of War of precious instructions to
rescue the world—a harmless remedy to drive away the plague. Do
not consider the words as too many. It is urgently requested of
you that you must carefully read this and reverence paper
with characters on it.*

Whereas we have heard that calamities are caused by atmospheric influences and destiny:—Good deeds can cause an avoidance of them. The terrific plague has recently been prevalent; it depresses the hearts and is painful to the sight. Although already people of the whole place distribute prescriptions and medicines free, and offer up all manner of prayers to avert the calamity, which means are the best that men can devise as preventives, yet the noxious influences have not been swept away. The reason of this failure is because the people have not done all the good deeds that they should to move Heaven and gain its approval.

It so happened that the gentlemen of the Society for Offering up Good Deeds, who had been eye-witnesses of the existing calamity, on the night of the 5th day of the 3rd moon, fasted and bathed their persons and reverently invited the gods to proclaim by Planchette a cure for the plague, to help the world. By good luck they were favoured by the presence of Kwan Tai (the God of War) who descended from heaven to put his hand to the pen (of the Planchette) to write out his instructions which are more than a timely warning.

Really this god has an ardent desire to awaken the sleeping world and to instruct the people!

Should we not earnestly reform betimes?

With respect we record below the words of the Planchette in full:—

[This is followed by three sets of scribbings representing the markings of the planchette. The first is not like any writing at all, and no translation of its import is given. From what follows it is evidently intended to represent the halberd of the god. "Revelations by Planchette" Nos. 2 and 3 have, however, renderings of their meaning given as below. They are somewhat like writing.]

Revelation by Planchette No. 2:—

The seal of Kwan So-and-So, Assistant Superintendent of the Department governing Pestilences.

Revelation by Planchette No. 3:—

Honesty, Bravery, Intelligence.

The unworthy know their unworthiness themselves.

Revelation by Planchette No. 4:—

I am the Great Han (dynasty) Kwan So-and-So.

I inform you who seek for medicine.

If worshippers ask concerning the things of the present,

You must know that the year has arrived at such a stage as not to be peaceful;

And moreover near the city is a coal mine,

And irritating poison has collected for a long time and is very powerful.

You at ordinary times are wicked and rude.

In times of distress repent before the Buddhas and chant liturgies.
 It is difficult to escape from destiny.
 Although there are charms and medicines, how can they be effectual?
 You say that Canton suffers from this plague;
 But I tell you that Shantung and Shansai will be more in danger.
 There have already been warnings in Kingchow and Chibli.
 Why have you not yet repented of your sins?
 Fate now makes no mistake.
 Firstly, men die because their destined existence ends.
 Secondly, because they are punished for their secret iniquities.
 The deaths now occurring only amount to ten or twenty per cent. of the
 number destined to die.
 The time is not yet up for the termination of this calamity.
 Strictly speaking I should not divulge what heaven has designed;
 But with a view to protect children and sympathize with mankind,
 There is nothing like carrying out an advice of mine.
 (If you do so) I shall myself attend to the matter.
 See how I acted in my previous engagements:
 On all sides the devils feared and the gods revered me.
 I entreat those who have no righteous thoughts, who slaughter animals
 as offerings to gods.
 Who spend much on joss paper, incense and candles—
 Can these deliver you from illnesses and prolong your lives?
 Repent of your sins before me betimes.
 Swearing before heaven that you will do so.
 Who is not aware of my bravery and propitiousness?
 You should neither secretly nor openly deceive your fellow-creatures.
 Vow that you will perform a charitable deed,
 And thus establish a proof of your contrition which is not of small value;
 Or show some evidence by founding charitable institutions;
 Or read my liturgy and follow to the letter the instructions therein
 contained.
 And when you have shown sufficiently that you have not deceived me,
 Kwan,
 If you read my liturgy for ten days, you will be heard.
 I, Kwan, shall appear then in person.
 You will then believe that I am to be revered and am propitious.

Revelation by Planchette No. 5:—

I, Kwan, was formerly favoured by the Emperor of the Ta Tsing (the present) dynasty by having conferred upon me certain additional titles: (these are) Inspector of all the Buddhas and all the Gods, Superintendent of the host of Genii and other Demi-gods, Dispenser of Elixirs and Permits of Longevity (and Governor) of the Dark Land which causes death, and Overseer of Matters connected with the Buddha, K'e Lam. To which was added the title of Celestial Excellency. Again, thanks to the Gemmeous Ruler, Who, appreciating me for my loyalty, faithfulness and uprightness, allowed all important matters directed by him in connection with heaven to be passed by me before being put into force.

On the 24th day of the third moon, I went to the Tin Ts'ai Kwán to offer congratulations on his birthday, and to deliberate concerning the important matters of life and death of the human race. Mounting back to the three heavenly gates I happened just to meet the two Gods of Fire and Wind and the Star of Gold, Venus, holding the Imperial Decree, descending from heaven to mortal abodes in great haste. I stopped them and asked them concerning their mission. From them I learned that Heaven was exasperated and said that the world was overcrowded with people and had been for a long time increasingly harbouring wicked men; that even a small child of three feet in height was also full of evil deeds. Heaven had ordered Venus to go to the Palace of the Sea Dragon (Neptune) on a certain day of a certain moon to again cause floods in the rivers, to make the winds and the waters come into conflict, and the fire and the pestilence to burst out, which were to scourge and destroy more than one half of the population as a manifestation of the endless permutations of the creative power. I hurriedly stopped them and ran up to the Palace of Heaven in haste, and with a distressed heart memorialized the Gemmeous Ruler, praying that he (the Ruler) would bear in mind the virtue of

having consideration for human life. Now, thanks to the Gemmeous Ruler, who revoked two of his decrees, has limited the time for destruction to half a year.

In every city or town, should there have been the number of five thousand families who had repented and showed true evidence of reformation, the Inspectors of Human Merits and Demerits on duty were to be directed to memorialize (in favour of them) to the Heavenly Throne. Whereupon the Heavenly Throne ordered me, Kwan, to superintend matters connected with the Board of Pestilential Visitations, and to immediately despatch one hundred Inspectors of Merits and Demerits to each province, and one thousand spirits of the defunct virtuous and upright Government Officials and demons of the night, whose duty it should be to go amongst the human race to examine their deeds. So now we have devils and men in company with each other. Is it possible for you men of flesh to be aware of this? But demons of pestilence do not enter the doors of those who are filial to their parents and true to their friends, and you need not be alarmed if you are (such).

I hope you unworthy creatures will remember the report made by me, Kwan, interceding on your behalf and my deepest sympathy for you. You should also remember my ardent desire in making these revelations by Planchette. Do not say that the calamity is now all over and that there is no danger. Of course, I have no right to reveal the secrets of Heaven without any reason; but I have been compelled to reveal them. Hence I have done so. I am apprehensive that one manuscript of my revelations would not induce people to carry out my intentions, thus frustrating the object of my urgent petition. Should any one be found presuming to blaspheme concerning these instructions of mine, then small offenders of this kind shall be consumed by the fire of pestilence; and as for the great offenders I shall order my orderly Chow Chong to put them to death with the halberd, which they are not to resent. Now as I, Kwan, am the Assistant Superintendent of the Board of Pestilence people cannot escape from this calamity without my assistance. I, Kwan, am an upright and just god and am not such a god as those who evert animals offered in sacrifice and worship. This being so, are my instructions to be trifled with? If you really crave my protection, let the rich subscribe their names to benevolent institutions. When I find there is any evidence of this being done, I shall be satisfied that they are sincere and true. Let those who are poor, recite my liturgy. If I find that their hearts are in accord with my liturgy, I shall be satisfied that they are sincere and true.

Should women be unable to read my liturgy, let them each morning and night burn some sticks of incense, and pray aloud, which will move me; but none except those who are loyal and filial, honest and virtuous, should read my liturgy. This is important. But as to those who were formerly wicked and cruel but now have become filial and faithful to friends, those who used false weights and measures and who have become honest and upright and in general have changed from all their former evil deeds, it is not too late for these classes to repent. If you are really sincere and will not deceive me, Kwan, you should swear before me and sketch out my precious halberd after the pattern given here, inserting in it the thirty-six circles which will serve as evidence of your sincerity.

Below it write the characters, "Assistant Superintendent of the Department governing Pestilences, the seal of Kwan So-and-So." These ten characters, together with the picture of the halberd, posted before the door of the house will prevent the demons of plague from disturbing you; but, on the other hand, if you, having not sworn before me and promised repentance, should have posted up my name without my authority, you shall not be treated with leniency, should this, your conduct, be reported to me by the Inspectors of Merits and Demerits. After your repentance you should immediately take the medicines I shall herein prescribe. In addition to so doing, burn some water purifying charms in your family wells and also throw into them some garlic and some *kuán chūng* (medicine). This is a precaution against plague because the water (in the family wells) is becoming colder and poisonous in the plague season, to which has been added the filthy fluid from the bodies of the dead rats which has percolated into them from the drains.

Without taking the above precautions nothing will be of avail in warding off the plague. Should there be any buboes on bodies of the sick, get some sharp pointed itching taro and rub it well on the chest and back and the joints of the bones. But as there are so many forms of diseases it is not easy for common

doctors to detect the symptoms of this disease. When the disease begins, more generally the head is giddy and it is accompanied with fever and cold at intervals, the mouth has a difficulty in articulating. If buboes appear on the skin with eruptions lined with red lines, use a silver needle to prick them, that the poisonous blood may ooze out; but if the dark poisonous blood has extended its attack to the heart the disease is highly dangerous, in which case get some sharp pointed itching taro and boil it with water in a clean saucepan till the water becomes thick with it. It (the water) should then be taken internally. This will dissipate the dark poisonous blood.

I. Kwan, for this special purpose have here given these my revelations (by Planchette), my ardent and real desire being to look after the country and relieve the people.

Do not compare these my instructions to false words, then I shall feel honoured. If any person distributes twenty copies of this, he will save himself, and, if two hundred copies, his whole family.

Take two mace each of (管仲) Kwún Chung, Ngau P'ong Tsz (牛旁子), Shán Chí Tsz (山枝子), Forsythia suspensa (連翹 Lín K'íú), Kwai shan (歸身), Libanotis (防風 Fong Fung), China root from Yunnan (雲苓 Wau Ling); Liquorice-root (甘草 Kam Ts'o) one mace; half a mace each of Atractylodes Chinensis or Rubra (蒼朮 Ts'ong Shut), Sz Ch'ün Justicia [or possibly leontice] (川連 Ch'ün Lín), Areea Catechu (檳榔 Pan Long), putehuk (木香 Muk Heung); four mace of Cypress (扁柏 P'ín Pak); three mace each of magnolia hypoleuca (厚樸 Hau P'ok), midsummer root [prepared from two or three Aroid plants] (法夏 Fát Há); five mace each of Evonymus Vieboldianus (?) (Wai Mau 衛茅), roots of rushes (?) [phragmites (?)] (蘆根 Lò Kan).

Should fever come on and buboes appear, boil the above medicines in water and take (the water) internally. In this illness sometimes there is a kind of evil wind enters into the chest. This wind will prevent the sufferer from swallowing and make him throw up any medicine he has taken. (If this is the case) first get one candarin weight of Tung Kwán powder and blow into the nostrils. For simultaneous purging and vomiting and cramp; for convulsions of infants, purging and vomiting where cooling medicines do no good with slight fever in the afternoon which is light during the day and heavy at night, with the eyes turning up: for these two ailments take away from the prescription the Ngau P'ong Tsz and Shán Chí Tsz, but boil the Yunnan China root and the Cypress, the Wai Mau and Lò with two mace each of Ts'ong Shut (Atractylodes Chinensis or Rubra) and Fok Heung (藿香), and one mace of cloves and take the water internally.

As regards those who are really sincere and faithful and suffering from diseases (other than those mentioned here) for curing which different diseases the above medicines are not the proper remedies, I will personally go to their houses to treat them.

I will not retract these words. I expressly give these revelations with the pen of the Planchette.

